JPRS-UST-87-005

12 MARCH 1987

USSR Report

SCIENCE AND TECHNOLOGY POLICY

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-UST-87-005

12 MARCH 1987

USSR REPORT

SCIENCE AND TECHNOLOGY POLICY

CONTENTS

/9835

ORGANIZATION, PLANNING AND COORDINATION

TERRITORIAL PLANNING OF SCIENTIFIC,TECHNICAL PROGRESS

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 9, Sep 86 pp 66-78, 79-85

[Article by V. Bitunov, deputy chief of a department of USSR Gosplan: "The Territorial Aspect of Planning Scientific and Technical Progress"; capitalized passages published in boldface; first paragraph is PLANOVOYE KHOZYAYSTVO introduction]

[Text] Scientific and technical progress--the decisive factor in the socioeconomic development of Soviet society. Intensification of the efforts of local organs in the realization of these tasks. Regional programs of scientific and technical progress in the national economic planning system.

The June (1986) Plenum of the CPSU Central Committee noted: "The acceleration of the technical retooling of existing production is one of the most urgent tasks of the new five-year plan. The plan calls for a dramatic increase in the share of capital investments to this end."[1] Accordingly, a general inventory of productive fixed capital is scheduled under the current five-year plan; annual retirement of obsolete [capital] will be sharply increased compared with the 11th Five-Year Plan and will reach the 5-6 percent mark.

More than one-third of all active fixed capital is scheduled for modernization during the quinquennium. At the same time, while there will be a considerable increase in resources--particularly in the form of highly productive equipment--they will nevertheless continue to be limited. From this is follows that the most effective solution must be found in every case; every new unit of equipment that is to be installed in the national economy must be sent where it can be assimilated in the shortest possible time and can produce the highest return.

The attainment of this objective presupposes the joint efforts of sectorial and territorial (local) organs. The latter can do much to accelerate scientific and technical progress and the technical reconstruction of the national economy.

The tasks of local organs in introducing the latest advances of science and technology in production were discussed in M.S. Gorbachev's report at the 11 June 1985 CPSU Central Committee conference on the acceleration of scientific and technical progress. The report noted in particular the need

for such major scientific and industrial centers as Moscow, Leningrad, Sverdlovsk, Kharkov, Novosibirsk, Donetsk, Omsk, Gorkiy, and others, to make a still greater contribution to the acceleration of scientific and technical progress. These principles were further developed in the materials of the 27th Party Congress. The congress' resolution on the Political Report of the CPSU Central Committee states: "The congress poses the in-depth technical reconstruction of the national economy on the basis of the latest advances of science and technology as a task of uppermost importance. Every sector, enterprise and association must have a clearly defined program for the continuous modernization of production."[2]

An enterprise is both a sectorial unit and a territorial unit. It is located in a certain territory. It uses territorial resources together with other enterprises. It has the production infrastructure and the social and cultural services sphere at its disposal. The success or failure of its work depends in large measure on the level of the economic and social development of this territory--the arena of its economic production activity.

Territorial (local) organs are more closely disposed toward the enterprise, have a good understanding of the situation in every collective, continuously observe its work, and see unresolved problems, inter alia, in the realm of scientific and technical progress. Of course, such problems are usually of a sectorial nature and require the participation of the leadership and specialists of a given sector. Scientific and technical policy is formulated and implemented by sectorial organizations and reflects the feasibility of the sectorial principle of management.

Nevertheless, in the realm of introduction of advances in science and technology and in the restructuring of all social production on that basis, for a long time there will continue to be many problems that will also depend to a considerable degree on territorial organs for their solution. For example, the elimination of strenuous, monotonous manual labor. Thus, the production of blanks is deconcentrated over approximately 25,000 plants. Centralized production satisfies 11-13 percent of the requirement for castings. The use of progressive casting techniques makes it possible to reduce the production cost of castings by one-third and to increase labor productivity two-to fourfold.[3] The mere improvement of the work of ministries in such questions cannot produce significant results. Reserves and problems are of an intersectorial, territorial rather than an intrasectorial nature. In more general form, it can be said that ministries striving to increase their output volume would prefer to take the easier road by expanding existing enterprises and building new ones. Territorial organs that are compelled to reckon with the scarcity of resources--labor, power, construction capacities, etc.--are often opposed to extensive methods because such a path frequently complicates the solution of social problems in their territory; it entails increasing the size of the work force and hence the size of the population as well and requires more manpower and resources to provide the population with all material and cultural necessities.

All this indicates the need for the closer combination of the sectorial and territorial approach to the resolution of economic and social problems. This is recognized by everyone. But the role and tasks of territorial--republic

and local--organs are far from being unequivocally understood everywhere. In many instances, the local soviets consider their basic task to be to serve the population, i.e., to build housing, to develop public transport, to improve medical care, etc.

This is unquestionably very important. But should the local soviets confine themselves to these questions alone? It seems to us that the councils of ministers of union and autonomus republics and the local soviets can, without relaxing their attention to these questions, also more actively influence the solution of questions pertaining to the economic production activity of enterprises. Due to objective economic conditions, they are frequently more interested in the technical retooling and further development of enterprises and organizations already in operation. On the other hand, because the local soviets are in everyday contact with the enterprises, they [the soviets] have a good knowledge of their needs, of unresolved questions, of weak points, and the available reserves of enterprises. Since they deal with many rather than few, with large and small, with leading and lagging enterprises, they can compare their work and make proposals to improve it. Obviously, every possibility known at the local level and by no means always known to ministries that are territorially separate from enterprises should be used to increase the effectiveness of production.

Proceeding from this, the following basic premises can be formulated. UNDER PRESENT CONDITIONS, DURING THE CONVERSION OF THE ECONOMY TO THE PATH OF INTENSIFICATION, IT IS EXPEDIENT TO STRENGTHEN THE INFLUENCE OF COUNCILS OF MINISTERS OF UNION AND AUTONOMOUS REPUBLICS AND LOCAL SOVIETS OF PEOPLE'S DEPUTIES ON THE DEVELOPMENT OF ENTERPRISES AND HENCE ON THE ECONOMIC DEVELOPMENT OF THE CORRESPONDING TERRITORY AS A WHOLE. Local soviets can actively influence the acceleration of socioeconomic development without supplanting sectorial organs, without infringing the rights of enterprises, but instead cooperating closely with one and the other. THE REAL UNIFICATION OF EFFORT WILL TAKE PLACE WHEN ONE AND THE SAME PLAN INDICATORS OF AN ENTERPRISE ARE INCLUDED IN BOTH THE SECTORIAL AND TERRITORIAL ASPECTS OF THE PLAN. Sectorial and territorial organs will acknowledge their responsibility for their fulfillment and will jointly struggle for it.

From the foregoing, it follows that enterprise development plans must be developed through the joint efforts of sectorial and territorial organs based on proposals and plans initially prepared by enterprises themselves. The sectorial principle is prevalent in practical activity. It is expressed in the fact that local soviets either do not submit their proposals on enterprises' plans, or these proposals do not reach the ministries, or they reach the ministries but are ignored by them. Sectorial organs devote their main attention to the examination of the plans of large, leading enterprises; the plans of small enterprises are usually not examined. But it is specifically the latter that swallow up a considerable part of the territorial resources.

THE WORK EXPERIENCE OF LOCAL PLANNING ORGANS SHOWS THAT THE MORE CAREFULLY THEY APPROACH THE EXAMINATION OF THE PLANS OF ALL ENTERPRISES AND ORGANIZATIONS LOCATION ON THEIR TERRITORY, THE HIGHER WILL BE THE LEVEL OF

ELABORATION OF THE PLAN FOR EACH ENTERPRISE AND CONSEQUENTLY FOR THE NATIONAL ECONOMY IN GENERAL.

Naturally, the participation of territorial organs in the planning of scientific and technical progress must proceed from thereal possibilities of local soviets. The territorial plan for scientific and technical progress must pose new tasks to the soviets and enterprises with respect to securing the economic and social development of the territory. But they must be equal to solving these tasks and the tasks must improve their work. What are the specific tasks of scientific and technical progress that the local organs can resolve? This question can only be answered by analyzing existing practice. Unfortunately, planning specialists at the local level do little to examine the available experience in this area. Nevertheless, the accumulated experience is quite diverse and makes it possible to identify a number of basic directions in planning. First of all, this entails the elaboration of the regional sections of the Comprehensive Program of Scientific-Technological Progress. The first comprehensive regional NTP programs were compiled in the late seventies and early eighties as component parts or regional sections of the unified Comprehensive NTP Program for all Union Republics and in the RSFSR--for economic regions and for certain large territorial economic formations: the Leningrad region (city and oblast), Moscow, and Moscow Oblast separately. They have been compiled up to the year 2005.

The question arises: are regional sections of comprehensive NTP programs necessary, are they not the simple application of general principles of union and sectorial programs to each individual region. Practice makes it possible to answer them. Regional programs reveal the special tasks of every region, make it possible to focus attention on them, and to determine which problems can be solved in a given instance. Thus, two specific sections have been elaborated in the Comprehensive NTP Program for Moscow: scientific and technical progress in the municipal economy and the organization of the work of the Moscow scientific complex. As we know, approximately 20 percent of everyone employed in the Moscow economy is working in the "science and science services" sector and has a good opportunity to utilize this potential (inter alia by unifying the efforts of various institutions in the solution of the most important problems). This presupposes the creation of the material base, the more precise definition of the composition and structure of the scientific complex (i.e., the expansion of certain research and the curtailment or transfer of other research to other regions), etc.

The section devoted to the municipal economy is important. In Moscow, hundreds of thousands of persons deconcentrated among numerous administrations, rayon services, offices, etc., work in this sector. The level of mechanization here is low. Nevertheless, Moscow has a wealth of progressive experience in the operation of its municipal economy and its scientific support is better than in other cities. The Moscow City Executive Committee has scientific research and design institutes in practically all basic sectors of the municipal economy (Moszhilremproyekt, MosvodokanalNIIproyekt, etc.), which other cities do not have. Moscow specifically has the most favorable conditions for the elaboration, testing, and introduction of new technical and organizational decisions that make it

possible to raise the level of service to the population with the same or an even smaller municipal economy work force.

While this is a long, complex work, it makes it possible to define the tasks, their scale, significance, and possible avenues of solution (or at least the directions of search) more precisely. Moscow's experience in one or another form is suitable for use in all other cities--large, medium-size, and small. All the foregoing also applies to other regional comprehensive NTP subprograms. Practical experience indicates the feasibility of their development and that they should become a constantly renewable element of pre-planning work. Naturally shortcomings have come to light in the effort to compile such programs. In a number of instances, indicators of scientific and technical progress have not been the framework of the entire program but have been even made to fit certain consolidated indicators of economic and social development. What is more, proposals of the corresponding sectors (or of sectorial institutes representing the interests of these sectors) have constituted the basic materials from which regional programs were developed. But among them there were none that would ensure the many-fold increase in the productivity of labor, the comprehensive and most effective use of natural resources, the more complete assessment of the features of a given region; moreover, the departmental approach was predominant in regional comprehensive programs.

The initial experience confirmed the feasibility of elaborating regional sections of comprehensive NTP programs for large economic regions, union republics, certain large autonomous republics, oblasts and cities. They must be, not a composite of sectorial proposals, but rather a document that contemplates the most effective economic development of a corresponding territory on the basis of the introduction of advances of NTP. They must help to overcome the departmental approach. They must be based on the broad introduction of machinery and technology ensuring a many-fold increase in labor productivity.

Regional charts of the development and location of the productive forces are another existing form. The feasibility of developing such charts is generally acknowledged; they have long ago become an integral part of practice. The problem is to improve their elaboration and utilization in planning. The charts are needed for determining the most effective ways of applying the resources of each region, which is possible only with the maximum acceleration of scientific and technical progress and the introduction of its advances. Accordingly, REGIONAL NTP PROGRAMS MUST BECOME THE BASIS OF REGIONAL CHARTS OF DEVELOPMENT AND LOCATION OF THE PRODUCTIVE FORCES, THAT WILL CONCRETIZE THE TASKS AND DIRECTIONS OF THE ECONOMIC DEVELOPMENT OF REGIONS ON THE BASIS OF THE HIGHER TECHNOLOGICAL LEVEL OF ALL SECTORS; lists of regional facilities to be rebuilt, the purpose of their reconstruction (economic output indicators), the priority of individual objects, and resource backing of works based on balance methods will be determined. In additional, regional charts will be strictly coordinated with sectorial charts, i.e., the same tasks, paths of development, resources, etc., will be targeted for each specific object in sectorial and regional charts. Charts prepared in this way can become the basis for the planned support of balanced and highly effective development of both sectors and territories. What is more, they will concentrate all basic

data for planning and surveying work for each entity (enterprise, deposit, industrial center, TPK, etc.). Based on the determination of priorities, the charts must also secure the concentration of resources and efforts in the most important entities, i.e., the prompt realization of the economic effect of measures.

The next stage is the development of territorial programs for the intensification of production based on the broad introduction of the most effective attainments of science and technology. The prototype of this program is the comprehensive territorial-sectorial program of development of the Leningrad and Leningrad Oblast economy based on automation with the broad introduction of the "Intensifikatsiya-90" system of computing and calculating equipment created at the initiative of Leningrad organizations (and under their leadership) through the joint efforts of scientific research organizations of Leningrad with the participation of ministries and departments and approved by USSR Gosplan, the USSR GKNT and the USSR Academy of Science in the period between 1984 and 1990 (7 years)[4]. On the whole, the program ensures high effectiveness: at an overall cost of approximately 3 billion rubles, the annual saving due to the lowering of production cost [sebestoimost] will be more than 900 million rubles.

Other territorial programs are also known. Thus the Latvian SSR has developed a complex of programs that address the most important problems in the development of the republic's economy that are being worked on by territorial and sectorial organs. Such is the program for the development of intersectorial production. One of its measures is to supply republic industry with the products of powder metallurgy. By way of implementing the program, a large shop for producing products from metal powders has been built at a Ministry of the Electrical Equipment Industry plant situated in the republic. Based on a joint decision of the republic and ministry, 30 percent of the output of this shop is distributed by republic organizations; the remaining 70 percent is distributed by the ministry outside the republic.

Mention can also be made of a program for the development of intersectorial production, which was developed for Moscow and Moscow Oblast, and the detailed "Intensifikatsiya" program that was developed for the Belorussian SSR. Also of interest is the experience of Ukrainian organizations actively participating in the development of programs of the republic academy of sciences.

A positive feature of the republic programs is that they ensure the 100 percent involvement of all enterprises and organizations situated in the republic. The development of programs was preceded by a survey of all enterprises and organizations. This revealed lagging sectorss and sectors where new technology produces the maximum effect at the lowest cost.

The question of five- and one-year regional new technology plans has not yet been resolved. In the majority of cases, such plans do not exist and doubts are expressed as to their feasibility. But existing experience indicates otherwise. First of all, there is the experience of Moscow--a very large city whose plan for economic and social development is drafted by the Moscow City Soviet's executive committee (based on proposals by ministries and

enterprises) and is approved by the USSR Council of Ministers. The plan extends to all enterprises and organizations located in the city and includes a section for scientific and technical progress. This section is elaborated in one- and five-year plans and consists of two parts. The first part is made up of concrete targets for the solution of scientific and technical problems pertaining to Moscow enterprises and organizations (i.e., targets for the development and fabrication of specific prototypes, for the development of specific ASU's, etc.). This part is included in the plan as a result of the compilation of extracts from centrally developed plans and includes special, sectorial measures that are not connected with one another and that do not substantially affect the overall scientific and technical level of industrial production in the city. City organs virtually do not monitor this part of the plan.

Another part of the plan that is confirmed for Moscow takes the form of general indicators of the technical level of production. The most important of them are targets for: reducing the share of manual labor (the planned level of manual labor is set for the end of the plan period); the modernization of the equipment park (the absolute number of machine tools and machines earmarked for the replacement of obsolete equipment); and raising the share of products in the highest quality category (the share of these products in total output). All three targets are approved by the USSR Council of Ministers at the level of ministries and departments. The Moscow City Executive Committee conducts work with large enterprises to improve these indicators and on this basis compiles its own plan which contains intensive targets. Accountability for their fulfillment is established, inter alia at the level of Moscow rayons. The course of fulfillment is systematically examined, taken into account in the process of totalling the results of the competition between rayons, etc. The level of the targets is based both on the potential of sectors and enterprises and on the general tasks of development of the urban economy, including the need to develop industry with a smaller work force. The introduction of plan indicators has generated a certain degree of intensification of the work of ministries and Moscow enterprises proper in all three directions.

Another example is the Georgian SSR--the only union republic that still has a republic science and technology committee. The republic gosplan also has a subdivision that plans new technology. A draft plan is also developed for all enterprises and organization on its territory and basic attention is devoted to indicators that generalize the effectiveness of technical progress. Since indicators of scientific and technical progress have been absent from forms of the union republic's one-year plan to date, this section of the plan is approved by the republic council of ministers. This plan has a substantial influence on economic development: for example, according to the data of republic organizations, the rate of curtailment of manual labor in all sectors of the republic rose 2-3-fold after its introduction.

THE CITED EXAMPLES SUGGEST THE CONCLUSION THAT IT IS FEASIBLE TO DEVELOP ONE- AND FIVE-YEAR PLANS OF SCIENTIFIC AND TECHNICAL PROGRESS FOR UNION REPUBLICS THAT ENCOMPASS NOT ONLY THEIR OWN (REPUBLIC, LOCAL) ECONOMY BUT THE ENTIRE TERRITORY AS WELL. Republics should draft such plans independently on the basis of the materials of enterprises and previously developed republic

programs; they should be examined by USSR Gosplan with the participation of ministries (consequently they must also be drafted at the sectorial level). Approved plans must be conveyed to the republics. The same targets, quotas and indicators assigned to specific enterprises and organizations must appear in both sectorial and territorial plans in generalized form.

This is presently not the case because there is no science and technology section in the union republic five-year plan and in the one-year plan there are only targets for the republic economy. Therefore the discussion must be not of improving, but rather of creating a system and indicators of the regional plan (but with due regard to existing practical experience).

The 3 August 1984 decree of the USSR Council of Ministers "On Certain Measures for Further Improving Territorial Planning" states that starting with the 12th Five-Year Plan, territorial targets for the development of industrial targets, broken down by ministry and department of the USSR, shall be approved in the one- and five-year plans of union republics. Ceilings on capital investments and construction-installation work are planned in the same way. The basic indicators of the most important sections of the republic plan for the territory as a whole, i.e., for all enterprises and organizations regardless of their subordination, are arrived at in this way. In our opinion, this principle should also be extended to the planning of scientific and technical progress--the most important part of all planning activity.

FOOTNOTES

1. PRAVDA, 17 June 1986.

2. "Materialy XXVII syezda Kommunisticheskoy partii Sovetskogo Soyuza" [Materials of the 27th CPSU Congress], Moscow, Politizdat, 1986, p 102.

3. See PLANOVOYE KHOZYAYSTVO, No 4, 1986, pp 94-98.

4. For more detail, see: B. Ulyanov, "The Economic Intensification Program of Leningrad and Leningrad Oblast," PLANOVOYE KHOZYAYSTVO, No 2, 1986, pp 85-90.

5013
CSO: 1814/33

COOPERATION OF SIBERIAN MINING INDUSTRY, ACADEMY OF SCIENCES

Moscow PRAVDA in Russian 2 Sep 86 p 3

[Article by Academician Ye. Shemyakin, director of the Mining Institute of the Siberian Department of the USSR Academy of Sciences: "Mountainous Siberia. Accelerate Scientific and Technical Progress"; first paragraph is PRAVDA introduction]

[Text] Today the country's mining industry is mainly being developed beyond the Urals. And therefore it is particularly important to introduce more rapidly and extensively here scientific and technical achievements and the machinery and technologies, which have been especially developed for Siberia. What is it today, mountainous Siberia, is it keeping up with scientific and technical progress?

In the cost of a ton of extracted metal, be it iron or complex ores, the basic expenditures are connected with mining operations and the transportation of the ore and concentrates. Metallurgical conversion and processing require a significantly smaller portion. But, however surprising it is, in practically all the sectors, which deal with mining machinery (except the coal industry), an overwhelming number of studies, experimental operations, and industrial tests concern namely metallurgical conversion.

In the meantime mining is raising more and more pointedly its own important problems. It is necessary to develop deposits under more difficult conditions (large depths, permafrost, hot springs). This requires a new level of knowledge about the structure and stress-strain state of the rock mass when designing, in the process of construction, and particularly during operation. But it is impossible to advance confidently here without developing methods and means of instrumental observations, without developing advanced measuring systems, and without automating them. Siberian scientists, working in close cooperating with their colleagues from the mining sectors and researchers from the CEMA member countries, in recent years have established rock pressure services for such systems instrumental observations in shafts and pits.

The huge scale of modern mining--the Kuzbass, the Kansk-Achinsk Heat and Power Complex, the Norilsk and Neryungri deposits--dictates to planning research organizations its own requirements: methods, which are based on the extensive use of computers--for the processing of geological information, for the

designing and management of large mining enterprises, for the simulation and analysis of typical situations--are being disseminated more and more actively. Associates of the Mining Institute and the Coal Institute of the Siberian Department of the USSR Academy of Sciences, together with specialists from the Ministry of the Coal Industry, have developed packages of applied programs for mining geometric calculations, for the planning of the development of deposits, and for the control of underground mining operations. These programs shift a good deal of preliminary work onto the computer: it computes the amounts of ore and barren rock, specifies the optimal transportation routes, and designates the location of shafts and other major mine workings.

The ever-increasing application of all-purpose and control computers and the development of instrument observations under full-scale conditions makes it possible to pose the question of developing what are called "unmanned" technologies.

The comprehensive utilization of raw materials is closely tied to nature conservation problems. A modern large mining enterprise, particularly strip mines and open pits, places thousands of hectares of arable land and pastures out of circulation, does considerable harm on forests and reservoirs, and pollutes the atmosphere, rivers, and lakes. Therefore, with each year the monitoring of the operation of enterprises is being tightened up, the maximum permissible norms of the concentration of harmful substances are being made more rigid, and newer and new methods of land recultivation are being introduced.

Researchers are faced with the task of developing new means of concentrating and processing solid raw materials, which are harmless to the environment. Among such means are the technology of dry separation, the recycling of waste water with preliminary treatment, the development of new methods of analysis, which help to detect and separate all useful components, and the secondary processing of waste products, including "tailings" of concentrating mills. Not only mining engineers, but also as physicists and chemists are dealing more and more actively with these problems. Researchers and engineers of the Ministry of Nonferrous Metallurgy and our institute have developed new technological processes of ore dressing with a considerable economic and ecological impact.

The questions of the development of domestic mining machinery for Siberia are attracting more and more attention. The attempts to use foreign equipment at the Neryungri coal deposit have shown that it is be more expedient not to bring in imported equipment that is expensive and unsuited for local conditions, but to develop and more quickly assimilate our own domestic developments. After all, 10 years ago the builders of the Baykal-Amur Railway Line and the main institute of the Ministry of Transport Construction were offered pioneer models of new drilling equipment (submersible air hammers, tunneling machines, rubble breakers, and others). But the institute and the Main Administration for the Construction of Tunnels and Subways for some reason recommended the acquisition of imported equipment, and the ministry followed their advice.

The basic attention of specialists in world mining science and practice has been focused on the development of methods which make it possible to use the energy of compressed air and electric drive for drilling through hard rock. Nevertheless, certain ministries, especially the Ministry of Nonferrous Metallurgy and the Ministry of Mineral Fertilizer Production, by a strong-willed decision specified the extensive scale of use of hydraulic impact equipment (again, mainly directing attention to imported equipment), even though technical solutions of the necessary scale had not yet been prepared either in the world or in our country.

In its own time our institute was the founder of an original direction in world practice--the development of drilling machines with submersible air hammers. Leading firms in the United States and Sweden took this route 20 years later, confirming the promise of machines of this type. In our country they are beginning to ready such equipment as obsolete for the dump. In the meantime the prospects of this direction are now also far from being exhausted: according to the estimates of specialists, it will help to increase labor productivity in underground mining operations by two- to threefold.

It is well known that the combination of inexpensive and easily manufactured vibratory devices with other kinds of mainline transport increases the labor productivity of a miner by three- to fivefold. This relates directly to the types of loading-delivering systems for underground and in part strip mining operations. Nevertheless, the designers of new types of transport of the Ministry of Ferrous Metallurgy, the Ministry of Nonferrous Metallurgy, and the Ministry of Mineral Fertilizer Production are for some reason setting these mutually complementary types of machinery against each other. And again self-propelled equipment is acquired mainly from abroad.

Finally, an increase in the volume and power-worker ratio at mining enterprises should correspond to reasonable specific capital investments per ton of mineral. Then labor productivity will increase owing to production intensification, and not due to the increase alone of fixed capital. This is an important technical and economic problem, and when solving it one must not forget that an absolute increase of the volumes of mining at an enterprise, an increase in the power-worker ratio, and the development of superpower excavators lead to the worsening of the quality of management, to the loss of reliability, and as a whole to the decrease of productivity.

The common root of evil: the lack of efficiently organized interaction between institutes of the mining type of the Academy of Sciences and sectorial science, is seen in the approach to similar problems. As a rule, an academic institute is obliged to go directly to the enterprise--the shaft, the mine, the pit, while the main scientific research institutes of the sector prefer to sit on the sidelines.

True, in recent years progress has been noted here--institutes of the Siberian Department of the USSR Academy of Sciences are changing over to direct interaction with a large number of union and republic ministries. But things are proceeding successfully only where sectorial scientific research institutes or design bureaus, which, as a rule, have better material and

technical supply and in general should be the makers of technical policy in the sector, are taking their place in the chain of interaction.

An excellent example of this is the cooperation with the Ministry of the Coal Industry and its main institutes (the establishment of rock pressure services in the shafts of the Kuzbass), with the Ministry of Nonferrous Metallurgy (the coordinated plan of operations with the Norilsk Mining and Metallurgical Combine), and with a group of Novosibirsk plants and design bureaus (the Trud Plant, the special design bureau of mining and ore dressing equipment, and so on).

But such examples are for the present only exceptions to the rule. While the rule is as follows: so far there is no mechanism which makes it possible to organize the reliable, economically and legally backed interaction of academic institutes with sectors. The all-union industrial associations did not become such a mechanism. Both scientific production associations and temporary collectives will not become it, if they do not use without fail the knowledge and experience of such a powerful intersectorial organization as the USSR Academy of Sciences is.

The experience, which has been gained at the Siberian Department of the USSR Academy of Sciences in mutually cooperation with mining ministries and mining enterprises, makes it possible to approach new forms of the stable cooperation of the academy with sectors. In my opinion, the time has come to revise the Statute on the Scientific Production Association, having defined more precisely in it the legal bases of interaction (the conducting of economic experiments, the economic contractual financing of promising research, and so on) between organizations of different departmental subordination. It is also important that this document would envisage the pooling of the material and technical resources of sectorial and academic organizations when fulfilling specific assignments in the interests of the sector.

The intensive development of the mining sectors is possible only in the direction of the combination of the entire scientific and technical potential of the country--engineers and scientists, innovators of production, the experimental design and production base--in the name of the accomplishment of several basic, clearly worded tasks. This is the only reliable path, which will lead us to the most abundant stores of the Siberian land and will help to place them entirely at the service of the national economy.

6289
CSO: 1814/50

FACILITIES AND MANPOWER

DECREE ON SHORTCOMINGS IN WORK OF SECTORIAL ORGANIZATIONS

Moscow SOBRANIYE POSTANOVLENIY PRAVITELSTVA SOYUZA SOVETSKIKH SOTSIALISTICHESKIKH RESPUBLIK in Russian No 26, 1986, pp 460-462]

[Summary of Decree No 686 of the USSR Council of Ministers "On Serious Shortcomings in the Activity of Several Sectorial Scientific Research and Planning and Design Organizations" of 11 June 1986]

[Text] Decree No 686 of the USSR Council of Ministers "On Serious Shortcomings in the Activity of Several Sectorial Scientific Research and Planning and Design Organizations" of 11 June 1986 (Summary)

In the decree it is noted that in the implementation of the policy of the acceleration of the socioeconomic development of the country, which was approved by the 27th CPSU Congress, an important role belongs to sectorial scientific research and planning and design organizations. The task is to increase substantially their contribution to scientific and technical progress, the renovation and retooling of the national economy, the development of new types of high-performance equipment, advanced technologies, and materials, and the increase of product quality. The work of these organizations should be brought closer to the needs of production.

The USSR Council of Ministers stressed that sectorial science has a developed network of scientific research institutes and design bureaus. Large scientific forces and much equipment are concentrated at them, and wherever they use them skillfully, high results are achieved.

At the same time it was indicated in the decree that the activity of a number of sectorial scientific research and design organizations is inefficient, is not of a creative nature, and does not have an appreciable influence on the increase of the technical level of production. The dispersal of assets and forces is being permitted, work of neither scientific nor practical value is being performed.

In the decree it is indicated that ministries and departments are slowly reorganizing their work on the improvement of the management of sectorial science in conformity with the decisions of the 27th CPSU Congress. The necessary monitoring of the activity of scientific research and planning and design organizations is not being implemented. They are often kept busy with

the drawing up of various kinds of reports and accounts. Several of them in essence have turned into an appendage of the central staff of ministries and departments. This is one of the basis causes of the extremely unsatisfactory use of the scientific and technical potential of the indicated organizations. The fact that individual executives of ministries approach in a noncritical manner the state of affairs at subordinate scientific research institutes and design bureaus and underestimate the importance of the quickest reorganization of their work for the purpose of the radical acceleration of scientific and technical progress, is arousing particular concern.

As the check made by the USSR State Committee for Science and Technology and the USSR Committee of People's Control showed, such institutes as the All-Union Scientific Research, Planning, and Design Institute for Integrated Technological Lines of the Ministry of Chemical and Petroleum Machine Building, the GiproNIImash of the Ministry of the Machine Tool and Tool Building Industry, the VNIIkompozit of the Norplast Association of the Ministry of the Chemical Industry, the Scientific Research Institute of Instrument Making of the USSR State Committee for Hydrometeorology and Environmental Control, the DzhezkazganNIPItsvetmet of the Kazakh SSR Ministry of Nonferrous Metallurgy, and the Scientific Research and Planning Institute of Automated Control Systems of Common Carrier Motor Transport of the RSFSR Ministry of Motor Transport are not making the proper contribution to the development of science and technology. The work of these institutes proved to be scientifically fruitless and does not satisfy the present demands of scientific and technical progress.

The USSR Council of Ministers adopted a decision on the elimination of the All-Union Scientific Research, Planning, and Design Institute for Integrated Technological Lines of the Ministry of Chemical and Petroleum Machine Building and the GiproNIImash of the Ministry of the Machine Tool and Tool Building Industry with the job placement of the personnel in accordance with established procedure.

Thus, the All-Union Scientific Research, Planning, and Design Institute for Integrated Technological Lines, which was established in 1974 and has 320 staff members, is not fulfilling the functions of either a scientific or a planning and design institute. At it not one development has been produced at the level of inventions, the research being conducted duplicates the themes of other institutes. Many management personnel are not displaying the proper responsibility for the assigned job and systematically permit upward distortions in state reporting. With the connivance of the ministry the number of highly paid personnel at this organization was artificially overstated: there are 176 managers of various levels for 71 ordinary staff members, moreover, only 13 people have an academic degree (candidate of sciences).

The GiproNIImash of the Ministry of the Machine Tool and Tool Building Industry, which has within it about 1,000 staff members, is working entirely unsatisfactorily. The indicated institute is not fulfilling the functions assigned to it of the main organization in the sector. Its scientific activity is aimed at the solution of narrow departmental problems without regard for the needs of the machine building complex as a whole. The plan of

work of the institute is overloaded with special, secondary themes, many of which are repeated from year to year, and only an extremely negligible number of them are promising and patentable. In the developments of this organization there is no orientation toward the use of resource-saving technologies and the complete mechanization and automation of production. The economic efficiency of the work of the indicated institute is very low.

In the decree it was emphasized that to a significant extent the identified shortcomings are a consequence of the intolerably poor work of the named ministries and departments with the checked institutes. The attention of Minister of the Machine Tool and Tool Building Industry Comrade B.V. Balmont and First Deputy Minister of Chemical and Petroleum Machine Building Comrade A.G. Rutskiy was directed to the unsatisfactory management for a number of years of the indicated institutes on the part of the ministries and the failure to take the necessary steps on the increase of the efficiency of their activity. USSR Ministers Comrades Balmont and Lukyavenko were obliged to consider the question of the personal liability of the officials who are to blame for this.

The corresponding USSR ministries and departments and councils of ministers of the union republics were ordered to radically reorganize the work of the other scientific research institutes and design bureaus, at which serious shortcomings were identified during the consideration of this question.

The USSR Council of Ministers obliged the executives of all ministries and departments to analyze thoroughly the activity of sectorial scientific research and planning and design organizations, to ensure the decisive improvement of their work in conformity with the present requirements of scientific and technical progress, and to increase the responsibility for the level and efficiency of research and development, as well as for the introduction of their results in practice. (Footnote 1) (PRAVDA, 27 June 1986).

7807
CSO: 1814/8

ROTOR INTERBRANCH SCIENTIFIC TECHNICAL COMPLEX

Moscow PRAVDA in Russian 14 Oct 86 p 3

[Article by Academician L. Koskhin, Hero of Socialist Labor, general director of the Rotor Interbranch Scientific Technical Complex: "Today, and Not Tomorrow"; first paragraph is PRAVDA introduction]

[Text] The creation of interbranch scientific technical complexes (MNTK) satisfies the most essential needs of a radical restructuring of the country's production potential and the acceleration of its progress. I want to stress the words "radical restructuring," because they reflect the essence of the matter. The need for a technical revolution in production is urgent. It is extremely important not to regard as it insignificant innovations or expensive "embellishments," which maintain unchanged the old technical basis of production and, consequently, its present, already obsolete indicators.

Precisely interbranch scientific technical complexes are capable of providing our science and industry with fundamentally new, highly efficient materials, technological processes, and machines which are capable of raising not simply the economy, but the entire social structure of society to a new level. For this the efforts of representatives of various scientific disciplines and research directions, which it is often not possible to bring together for the accomplishment of the necessary tasks, are united in them. But the main thing is that their emergence breaks down fossilized interdepartmental barriers. For many latest directions and advanced technologies by their nature are universal, but the sectorial structure limited the range of their introduction.

In the last analysis one of the decisive factors for making a breakthrough into the future is machine performance. There also exists here its own limits, which correspond to each epoch and to the level of its technological possibilities. It is very important to identify these limits clearly. Here it is like in the speed of motion. For a pedestrian and for an IL-18 airplane it seems incomparable, in fact it is in principle subsonic. A stone hatchet of a primitive craftsman and a lathe tool are incomparable. In fact these are actually the same tool, which has been improved with time and has been fitted with attachments which speed up and refine its action. Power drive, an electric motor, a robot, and numerical control might be included among these attachments, but the essence remains the same: the technologically active

point machines the entire surface of the part or item. Consequently, there is a limit of performance that cannot be exceeded.

The first revolution that changed the essence of processing machinery was the appearance of such units that combined the previously interrupted transport and technological flows. Now they were not disrupted, but coincided--machining was accomplished by the very transportation of a billet through the tool, which in addition acted on it not with a point, but with a line. For example, rolling mills and drawbenches, paper-making machines, and a number of others, with whose use many economic and social achievements of the recent centuries are connected.

Finally it was possible to combine the motion of the tool with the transfer motion of the billet. That is, to machine it, as they say, "on the move." This eliminated many limitations and helped to increase sharply the performance, which ceased to depend on the replacement and "capabilities" of the tool.

A new class of machines, which received the name of rotary and rotary-conveyor machines, was also developed on the basis of such a principle.

Let's assume that we need to create an automatic line in which dozens of presses and lathes, each of which performs its own operation, are involved. But one has a machining time of 3 seconds, the other--3 minutes. The machines of the first class are simply incapable of being "integrated." The automatic rotary line solves this problem.

A technological rotor in its most general form is a rotating cylinder, in whose "seats" the machining of a part takes place. No matter how different the duration of the operations is, equal performance is guaranteed to all of them. The share of tools in the total weight of the machine increases sharply. It is possible to carry out their replacement and readjustment for the changeover to a new part without halting the work. In essence an entire shop with many machines and many people can be replaced by one comparatively small rotary line.

The main economic indicator--the social productivity of labor--increases by tens and hundreds of fold due to the advantages of advanced technology, which is multiplied by the efficiency of the new class. This is the direct road to automated plants.

During the years of its existence our design bureau has developed about 200 types of such lines. They purpose is diverse. Plastic metal working and machining, heat and chemical treatment, including the application of protective, technological, and decorative coatings. The checking of dimensions, internal and external flaws, configurations, and the weight of parts. The production of items made of various types of polymer and composite materials by the method of molding and injection molding. The assembly and packaging of mass-produced items....

Such ministries as the ministries of the chemical, electrical equipment, automotive, and radio industries, and the State Agroindustrial Committee are

willingly cooperating with us. At their enterprises thousands of people have been already been freed in the production of needle bearings, combine chains, aerosol valves, radio and electrical parts, and so on.

But one must frankly say that this is just a drop in our production ocean. Up to now these were enterprising operations, which came from the helplessness of the situation of the producers themselves, whose plans run into millions and tens of millions of articles per year, while the production conditions have become obsolete. However paradoxical, machine builders and especially machine tool builders did not rush to respond to this need. For it is no secret that it is much more profitable to give birth to another multi-ton mechanical dinosaur than to reorganize for the production of new efficient machines. Here people themselves reversed as they could. To the point that skilled mechanics used for rotor modules railroad wheels, axles, and so on, which were obtained wherever possible.

The decision of the party and the government to organize the Rotor Interbranch Scientific Technical Complex is sweeping away this system, just as it is sweeping away interdepartmental barriers. The governmental decree on the Rotor Interbranch Scientific Technical Complex calls for the singling out in ministries of main scientific research and design organizations which under the supervision of our design bureau will develop automated lines for their own sectors and will study the demand for them.

The range of such lines has been distributed among the machine building ministries. For example, the Ministry of the Machine Tool and Tool Building Industry should develop lines for machining, stamping, casting, the manufacture of various items made from plastics and powdered metals, the manufacture and assembly of parts of furniture accessories, and others. The Ministry of Instrument Making, Automation Equipment, and Control Systems was assigned lines for the assembly of fountain pens and items for the medical industry. The Ministry of Heavy and Transport Machine Building--lines for parts of individual assemblies for metallurgical, ore mining, mine shaft, materials-handling, and railroad equipment, welding electrodes, and others. The Ministry of Machine Building for Animal Husbandry and Fodder Production--lines for parts of machines, which are intended for animal husbandry, poultry raising, fodder production, and others.

The lines for bearings, numerous motor vehicle parts, electrical, industrial rubber, and various plastic items, brick, tile, and much more are "allotted" in exactly the same way.

In all 8,450 rotary and rotary-conveyor lines should be added in our country during this five-year plan.

But, obviously, this also is only the beginning. A universal and careful analysis of production and the identification of the items, which require transfer to the rotary "tracks" now or in the future, are needed. Of course, it is always necessary to introduce automatic equipment only in case of the guarantee of its efficiency. At the same time, however, it is impossible to tolerate it when modernization follows a mistaken path. When in essence the same fundamentally obsolete machines, which, however, have been supplemented

by a large number of units, which do not produce, do not pay for themselves, and increase by many fold the total cost of equipment per unit of performance, are behind high-sounding fashionable terms--flexible machine systems, robotic complexes, and so on.

Considerable attention has also been given to the training of specialists. A new department was organized for this purpose at the Moscow Higher Technical School imeni Bauman. It is planned starting in 1988 to graduate not less than 200 engineers and technicians in the designing and development of lines and not less than 700 in adjustment, maintenance, and repair. Much construction is planned in order to have an educational methods and pilot production base.

But it is too early to say that this has solved all the problems. For example, the intersectorial scientific information center attached to our design bureau should go into operation in 1989. Hence, we will begin no earlier than 1990 to deal properly with specialists of various sectors and to help them in practice to design the needed lines. But the five-year plan will have already passed. We are now accepting many people sent for experience and are provided what assistance we can. But we are not at all able to assist them with housing and to allot them the workplace of a designer--after all, the design bureau is busy with its own assignments. One completed building, in which a dormitory for the newcomers and working space would be located, will help us to begin this work already today.

It is planned in 1993 to put into operation a pilot plant for the manufacture of standard components of lines, which have been ordered by various departments. Just think, it will begin to take part in our technical revolution only at the end of the next five-year plan. Is this not too late? But it is also possible to allocate a ready works. How many of them, which are not doing anything revolutionary in technology, will produce hundreds and thousands of obsolete machine tools in this time?

It is necessary to shift the available resources more vigorously and already today to lay the foundations for machines that will come to us in two or three five-year plans. To look more boldly to the future. Progress does not tolerate its postponement until tomorrow.

6289
CSO: 1814/50

INFORMATION REFERENCE BANK OF STATE STATISTICS

Moscow VESTNIK STATISTIKI in Russian No 5, May 86 pp 74-77

[Article by G. Simakova, S. Tiokhin, and V. Gopman under the rubric "News Items and Information" (Moscow): "The Sectorial Information Reference Bank of Scientific and Technical Information Is Being Established in the USSR Central Statistical Administration"]

[Text] The further development of state statistics in many respects depends on the improvement of the entire system of scientific and technical information. Its place and role are determined, on the one hand, by the complexity, diversity, and dynamism of the processes occurring in the national economy of the country and, on the other, by the rapid development of research activity in the area of state statistics and the means of its automation and by the increase of special literature. Hence arises the task of continuously improving all information service in the system of the USSR Central Statistical Administration.

At present the technical assignment for the establishment of an automated scientific and technical information system (the Statistika ASNTI) for the union level has been drawn up and approved, and the development of an integrated system of the management and formation of the sectorial information reference bank (the Statistika OSIF) has also been started. This system is being established for the purpose of improving the information supply of management personnel of the central staff of the USSR Central Statistical Administration, the central statistical administrations of the union republics, and oblast and rayon statistical organs, managers of organizations and enterprises of the system of the USSR Central Statistical Administration, scientists, economists, engineering and technical personnel, and specialists of organs of state statistics. It is envisaged to ensure immediate access to the Statistika Sectorial Information Reference Bank and the mutual exchange of information with the automated systems of all-union and sectorial information organs.

The establishment of the sectorial bank and the introduction of the Statistika Automated Scientific and Technical Information System in the system of the USSR Central Statistical Administration should broaden the sphere of activity of the Scientific Research Institute of the USSR Central Statistical Administration, to which the functions of the Central Sectorial Organ of

Scientific and Technical Information in Accounting and Statistics (the TsOONTI of the USSR Central Statistical Administration) have been assigned. This organ should ensure the realization of three basic functions: the scientific information function, which has as a goal the semantic processing of arriving primary information and the preparation of information materials of various types, forms, and levels; the publishing function, which ensures the preparation and publication of information materials; the library function. In this connection the integration of the activity of the Central Sectorial Organ of Scientific and Technical Information with the Scientific Library of the USSR Central Statistical Administration is advisable. As a result the possibility of the uniform configuration of banks, the one-time processing of large flows of primary information, and the repeated use of special literature will be ensured. Such an information reference bank should be developed with allowance made for two basic factors--the demands, which the State Automated Scientific and Technical Information System (GASNTI) makes on all the sectorial scientific and technical information organs which belong to it, and the information needs of the users of the system of the USSR Central Statistical Administration. This bank (in conformity with the demands made on the bank of any central sectorial scientific and technical information organ which belongs to the State Automated Scientific and Technical Information System) will reflect more completely all the information on questions of the theory and practice of accounting and statistics, which is published in our country and abroad. The information reference service of staff members of the system of the USSR Central Statistical Administration is based on the consideration of the multidisciplinary nature of their interests and information inquiries, which are determined by the fact that each of the subdivisions and organizations of the USSR Central Statistical Administration and the central statistical administrations of the union republics, in addition to information on questions of accounting and statistics, needs scientific and technical information which is connected with their thematic orientation (industry, agriculture, computer technology, and so on). During the investigation of the information interests of the potential users of the Statistika Bank the thematic composition of the bank, which was formulated with the use of the Subject Index of the State Automated Scientific and Technical Information System, was determined. It is proposed to include in the bank information from the following headings: Statistics; the Social Sciences as a Whole; Sociology; Demography; Economics. Economic Sciences; State and Law. Juridical Sciences; The Science of Science; Culture; Information Science; Mathematics; Cybernetics; Automation and Remote Control; Computer Technology; Standardization. Patent Affairs. Invention. Efficiency Promotion; Environmental Protection.

Thus, the information reference service of the users of scientific and technical information in the system of the USSR Central Statistical Administration should be carried out by the establishment and keeping of a sectorial bank on questions of accounting and statistics, as well as a reference and retrieval system (SPA), which contains data on the documents on the themes of the headings named above, which are of interest for the users of the system of the USSR Central Statistical Administration.

In the Statistika Automated Scientific and Technical Information System the decentralized gathering and processing of sectorial information and the

centralized making up of the reference bank will be combined with the requirement of the one-time processing of the information and its repeated use. The technology of processing documents in the sectorial bank envisages the thematic cooperation of information processing among the information services of the system of the USSR Central Statistical Administration, which consists in the fact that each of its participants processes only the types of primary documents, which are attached to it, and in so doing can use any materials of the centralized bank which is being formed.

The documents stored in the bank can contain texts in both natural and formalized languages and can be realized on various media. Both primary documents (that is, ones which contain information which directly reflects the results of the study of some question, for example, monographs, collections of works on a specific theme, educational publications, journal and newspaper articles, and so on) and secondary documents, which were prepared during the information analysis on the basis of the study and conversion of primary documents, for example, surveys, abstracts, annotations, reference works, bibliographical publications and card files, and so on, are to be stored.

The formation of the sectorial bank is based on the following basic principles: 1) a problem-goal orientation, which determines the system of the formation of the banks on the basis of and with allowance made for the planned tasks, goals, and problems, which face the subdivisions and organizations of the USSR Central Statistical Administration, the information reference service of which is carried out on the basis of the documents which are contained in this bank; 2) completeness, which presumes the availability of such documents, by means of which it would be possible to satisfy the bulk of requests of the people and collectives, which use the information services of the given bank; 3) systems interaction with the banks of other organizations, which ensures the possibility of obtaining the documents needed by the user not on the themes of the given bank.

The reference and retrieval system of the bank (which is a set of alphabetical and systematic catalogs, card files, bibliographical and abstract publications, encyclopedias, dictionaries, reference works, and so on) is formed centrally and contains data on all the documents not only on questions of accounting and statistics, but also on a broader group of questions which are of interest for the users of the system of the USSR Central Statistical Administration (in accordance with the headings listed above). Among them are a bibliographical description of the document, an annotation, and the storage address (the decentralized banks of subdivisions and organizations of the USSR Central Statistical Administration, the central sectorial banks of the country, main libraries). The centralization of the reference and retrieval system--given the decentralized configuration of banks--makes it possible to ensure the maximum completeness from the standpoint of the availability of data on the documents and at the same time makes it possible to reduce duplication to a minimum when configuring them.

It is necessary to emphasize that the maximum completeness of the bank is guaranteed only at the level of the reference and retrieval system. In other words, the storage of the entire set of only secondary documents with the indication of the addresses of the corresponding primary documents is

mandatory. Given such an approach the problems of an organizational and economic nature of the formation and keeping of the banks, which are connected with the difficulties of acquiring and storing the entire set of primary documents, are solved.

The Statistika Sectorial Information Reference Bank will consist of the set of decentralized banks of the subdivisions and organizations of the system of the USSR Central Statistical Administration, which are formed on the basis of uniform methodological principles and have a common reference and retrieval system (which is actually in the Central Sectorial Organ of Scientific and Technical Information in Accounting and Statistics). It is proposed to create such decentralized banks, which are specialized with allowance made for the information needs and specific interests of the users, in the USSR Central Statistical Administration and the subdivisions and organizations, which are subordinate to it, as well as in the central statistical administrations of the union republics (on the basis of the existing banks of scientific, scientific and technical, and technical libraries). The thematic composition and directions of the configuration of the information reference banks are determined jointly by the Central Sectorial Organ of Scientific and Technical Information in Accounting and Statistics and the corresponding scientific and technical information organs with the participation of interested organizations, on the basis of their current and long-range plans with allowance made for the type and specialization.

The functioning of the sectorial information reference bank should ensure its interaction both with the banks of higher levels (which belong to the State Automated Scientific and Technical Information System) and with the specialized banks of the subdivisions and organizations of the USSR Central Statistical Administration. This will make it possible to increase the efficiency of the information reference service of users by means of the specialization of the information reference banks of lower levels and the bringing of them as close as possible to the users (on the condition of the centralized elaboration and introduction of uniform methodological principles, the centralization of the reference and retrieval system, and the efficient use of the equipment of information reference service, which it is advisable to have in the banks of higher levels). Interaction is achieved on the basis of the combination of such forms as the coordination, cooperation, and centralization of individual information reference banks. Coordination means the division of the duties on configuration among the banks of the subdivisions and organizations of the system of the USSR Central Statistical Administration subject to such factors as the themes, types and kinds of documents, and the categories of users. Cooperation presumes the uniting of the efforts of the scientific and technical information organs of the system of the USSR Central Statistical Administration for the fulfillment of individual specific tasks on configuration and information service. Centralization means the assignment of some individual task (or a number of tasks) to one organ.

It should, however, be noted that in a number of instances for the convenience of the users and the satisfaction of the requirements of the efficiency of their services a mandatory minimum of coincident types and descriptions of documents in all the banks is necessary, which, in reality, means the

duplication of the latter. Among such documents there are first of all books, pamphlets, periodicals, and serials in Russian on questions of the theory and practice of statistics. Of course, when planning the configuration of the banks (during the study of the thematic plans of the publishing houses and publishing organizations and the catalogs of the Main Administration for the Distribution of Printed Matter) the planned composition of all the banks should be coordinated to the maximum possible degree so that the considerations of the saving of assets would not come into conflict with the requirements of the completeness, accuracy, and promptness of information reference service.

Let us examine the categories of the documents which are liable to conclusion in the Statistika Sectorial Information Reference Bank.

Books and Pamphlets. The documents, which are grouped with this category, are the most important means of the accumulation, systematization, and generalization of scientific and technical information. The books and pamphlets both of central and local publishing houses and of various publishing organizations, including ones which use means of rapid printing, should be included in the sectorial bank. The analysis of the official publications of the All-Union Book Chamber and the USSR State Bibliographical Indices "Knizhnaya letopis. Osnovnoy vypusk" [Book Annals. Principal Issue] and "Knizhnaya letopis. Dopolnitelnyy vypusk. Knigi i broshyury" [Book Annals. Supplementary Issue. Books and Pamphlets], which contain information on the books and pamphlets published in our country in all languages, showed that the distinction of publications on the theory and practice of accounting and statistics entails certain difficulties. According to the system of library classification, which the All-Union Book Chamber uses, the literature along the lines of the Statistika Sectorial Bank should have been included only in the sections "National Economic Accounting. Economic Statistics," "Statistics," "Demography," and "Mathematical Statistics." However, in practice not more than 50 percent of all the books and pamphlets on statistics are included in these sections, while the remainder are assigned to other (primarily, but not exclusively sectorial economic) sections, that is, nearly half of the publications are lost for the users of statistical literature, since far from every specialist is able to engage in the complete scanning of bibliographical publications in order to guarantee the completeness of the search. As to books and pamphlets in foreign languages, it is possible to obtain information on them only from SVODNYY BYULLETEN INOSTRANNYKH KNIG, POSTUPIVSHIKH V BIBLIOTEKI SSSR; here, however, it is impossible to estimate what share of the total number of books, which are published abroad on these questions in a year, the books acquired by USSR libraries make up.

Statistical Reference Publications. A specific trait of the Statistika Sectorial Bank is the formation of statistical yearbooks, materials of censuses, surveys, and so on into an independent file. Although formally these publications are grouped with the category "Books and Pamphlets," for the users of the system of the USSR Central Statistical Administration it is more advisable to separate the publications of this category, which contain primarily statistical data, from others which are devoted to questions of the theory and practice of statistics. Reference publications are concentrated mainly in the system of the USSR Central Statistical Administration and get

there as a result of international book exchange. At a number of foreign statistical organizations the practice of sending their publications to the USSR Central Statistical Administration exists--they should also be included in the bank.

Materials of Symposiums, Conferences, Meetings, Seminars, and So On. The organization of the gathering and transfer to the All-Union Scientific and Technical Information Center of information materials of all-union and republic symposiums, conferences, scientific and technical meetings, seminars, and so on, which are held in the system of the USSR Central Statistical Administration, has been assigned to the Scientific Research Institute of the USSR Central Statistical Administration. The information on planned meetings and other measures, which are being implemented outside the system of the USSR Central Statistical Administration, is contained in special publications of the State Committee for Science and Technology, the All-Union Institute of Scientific and Technical Information, and the Exhibition of National Economic Achievements, while the information on the implemented measures and their materials is contained in publications of the All-Union Scientific and Technical Information Center.

Dictionaries and Reference Publications. Terminological, explanatory, and special multilingual and bilingual dictionaries, as well as publications of an encyclopedic reference nature are assigned to this category. When forming this file it is necessary to use a sufficiently complete selection of publications of this sort.

Educational Publications. Their formation into a special category is connected with the existence in the structure of the USSR Central Statistical Administration of a specific subdivision--the Main Administration of Personnel Training, in the educational network of which about 250 educational institutions are included. Along with textbooks and study aids on statistics the educational methods documents of the Main Administration of Personnel Training are assigned to this category. The storage of the documents of this category in the bank of the Main Administration of Personnel Training, in which the creation of a deposit bank which contains educational publications of past years, which are of methodological and historical value, is planned, is being proposed.

Periodical and Serials. In addition to the basic domestic periodical, which is devoted to questions of the theory and practice of statistics (VOPROSY STATISTIKI), articles on themes of the sector are published in other publications--primarily (although not exclusively) in economic journals and newspapers, as well as in specialized sectorial publications (published works on various aspects of sectorial statistics).

Documents Generated in the System of the USSR Central Statistical Administration. In particular, the forms of statistical reporting, as well as the instructions and procedural directions on filling them out are assigned to this category.

Standard Technical Documentation. Special types of scientific and technical literature, which have the status of legal documents--standards (including

all-union state standards, which regulate the activity of scientific and technical information organs--in accordance with the system of standards "Information, Librarianship, and Publishing (SIBID)"), standard documents on questions of the Automated System of State Statistics, intersectorial and sectorwide materials on the problems of the development of automated control systems and the introduction of computer hardware, instructions, norms, and so on--are assigned to this category.

Deposited Manuscripts. The depositing of manuscripts of articles, surveys, monographs, collections of scientific works, and materials of symposiums, conferences, and meetings on the theory and practice of statistics has been assigned to the Central Sectorial Organ of Scientific and Technical Information in Accounting and Statistics of the USSR Central Statistical Administration. The information on the manuscripts, which have been deposited in all the scientific and technical information organs of the country, is published in the information publication of the All-Union Institute of Scientific and Technical Information, "Deponirovannyye nauchnyye raboty" [Deposited Scientific Works].

Dissertations and Author Abstracts. Dissertations on the themes of the Statistical Sectorial Bank for the most part are grouped with the following specialties: "Statistics," "Accounting and the Analysis of Economic Activity," "Mathematical Methods and the Application of Computer Technology in Economic Research, Planning, and the Management of the National Economy and Its Sectors," and "The Economics of Population and Demography." It is possible to obtain information on dissertations from the index of the All-Union Book Chamber, "Knizhnaya letopis. Dopolnitelnyy vypusk. Avtoreferaty dissertatsiy" [Book Annals. Supplementary Edition. Dissertation Abstracts].

Scientific and Technical Reporting Documents on Research and Development. The documents of this category reflect the results of scientific research, planning and technological, and experimental design work. Their registration and recording are carried out without fail by the All-Union Scientific and Technical Information Center, at which a statewide bank of reports has been created. On the basis of the received materials (registration and information cards) BYULLETEN REGISTRATSII NIR I OKR, in which lists of newly registered works with the indication of their performers (organizations) are published, and SBORNIK REFERATOV NIR I OKR, which contains abstracts of completed research and development, as well as the abstracts of the State Bank of Information Materials of All-Union and Republic Scientific and Scientific and Technical Symposiums, Conferences, Meetings, and Seminars, are published.

Translations of Scientific and Technical Literature and Documents. The unpublished translations, which are made with by the staff members of organizations and institutions or in accordance with orders of these organizations and institutions by the All-Union Center of Translations (VTsP), the USSR Chamber of Commerce and Trade, and several other organs, are assigned to this category.

During the elaboration of the technical assignment for the Statistika Automated Scientific and Technical Information System an estimate of the average annual increase of documents in the system was made (on the basis of

the study of the corresponding bibliographical publications). According to preliminary estimates, the size of the basic bank of primary and secondary documents on questions of accounting and statistics will increase annually by 5,000 units, while the number of secondary documents on related fields of science and technology, which are of interest for the users of the bank, will increased by more than 15,000 units.

An experimental database of the Statistika Automated Scientific and Technical Information System, which is being realized by means of the ASPID-3 applied program package, is presently being created. The data on instructions and procedural directions of the USSR Central Statistical Administration on the filling out of statistical reporting forms is being used as the initial information. The use of applied program packages like ASPID will make it possible subsequently to ensure information and program compatibility when implementing automated scientific and technical information systems at the union and republic levels on computers like the YeS and SM.

7807
CSO: 1814/8

PHYSICISTS DISCOVER RAREFIED SHOCK WAVE PHENOMENON

Moscow IZVESTIYA in Russian 29 Aug 86 p 3

[Article by I. Novodvorskiy under the rubric "Discoveries of Our Days": "An Explosion in Reverse"; first paragraph is IZVESTIYA introduction]

[Text] On 28 August 1986 the USSR State Committee for Inventions and Discoveries registered a discovery in the field of physics, which was made by a group of Moscow and Novosibirsk scientists: Candidates of Physical Mathematical Sciences Al. Borisov and An. Borisov, Academician Ya. Zeldovich, Doctor of Technical Sciences A. Ivanov, Academician S. Kutateladze, Corresponding Member of the USSR Academy of Sciences V. Nakoryakov, and Doctor of Technical Sciences S. Novikov.

The shock wave--a widely known phenomenon--is the practically instantaneous compression of a medium--an abrupt increase in its density and pressure. It is generated, for example, by an explosion or by the movement of an aircraft at supersonic speed. Scientists predicted and discovered this phenomenon more than a century ago and studied it quite thoroughly, which was dictated by the needs of practice.

However, the question of whether pressure and density can abruptly decrease, that is, can there be shock waves of rarefaction, remains open. It seemed that they cannot--it was believed that this would contradict the basic laws of thermodynamics.

The authors of the discovery succeeded in showing that shock waves of rarefaction exist under certain conditions and are entirely legitimate from a thermodynamic point of view. These conditions are the critical state of matter: the transition from the gas to the liquid phase and other phase transitions,as well as recrystallization in solid matter. D.I. Mendeleyev devoted attention to the critical state of matter, in which very unusual properties come to light: a strong increase in viscosity and opacity, an anomalous decrease of the speed of sound with an increase of pressure.

This anomaly (in the ordinary state, the speed of sound increases with an increase of pressure) under certain conditions gives rise to another anomaly--shock waves of rarefaction.

Despite the uniqueness of this phenomenon, its scientific and practical significance is very substantial. On its basis new methods of studying the properties and structure of matter in the area of phase transformations appeared, for the first time it has become possible to study the strength properties of materials given ultrashort times of loading, at high speeds of deformation and high pressures.

In addition, consideration of this phenomenon increases the precision of the design forecast of the behavior of solids in case of destruction and of liquids in case of abrupt ruptures, as well as makes it possible to more completely simulate the processes of the operation of power plants, the functioning of which is involves with near-critical states of matter.

5013
CSO:1814/57

INTERDEPARTMENTAL COMMISSION FOR INTRODUCTION OF INVENTIONS

Moscow IZVESTIYA in Russian 7 Sep 86 p 2

[Interview with First Deputy Chairman of the USSR State Planning Committee Anatoliy Antonovich Reut, chief of the Interdepartmental Commission for Questions of the Acceleration of the Introduction of Especially Important Inventions in the National Economy, by IZVESTIYA science commentator B. Konovalov under the rubric "The Key Task Is Introduction": "An Impact of Billions of Rubles"; date, place, and occasion not given; first paragraph is IZVESTIYA introduction]

[Text] An interview with First Deputy Chairman of the USSR State Planning Committee A.A. Reut on the work of the Interdepartmental Committee for Questions of the Acceleration of the Introduction of Especially Important Inventions In the National Economy, of which he is in charge.

[Question] Anatoliy Antonovich, pleas tell me when the interdepartmental commission was established and in accordance with what traits do you select inventions for consideration?

[Answer] The very name of our commission defines the essence of its work. It was established in March 1985 and deals mainly with inventions, the extensive use of which can yield an economic impact of hundreds of millions, and at times billions of rubles.

The scope of invention activity in our country is enormous. The State Committee for Inventions and Discoveries is now registering annually 75,000-85,000 inventions. But, of course, not all of them are of equal value. Thus, in 1984, 24,500 inventions, which were used for the first time, for the country as a whole yielded an economic impact of 2.2 billion rubles. And 600 of them provided a saving of 900 million rubles. Our commission is focusing its attention on the most significant inventions of this sort, which have already been tested in the national economy and guarantee a large economic or social impact. Our task is to organize the large-scale duplication of these especially important inventions. Unfortunately, for the present "introduction" very often is of only a demonstration, and not a mass nature. The statistics show that 97 percent of the introduced inventions are used at only one enterprise, and only 0.5 percent are used at three to five. The

potential, to which inventors' thought gives rise, for the present is not serving the country properly.

And the situation is particularly bad with inventions of an intersectorial nature, which for the most part originate at academic institutes and higher educational institutions of the country. As a whole about one-third of the inventions are used in our country. At the same time only 10 percent of the inventions of academic and VUZ scientists are used in the national economy.

Among the most important ones our commission selects the inventions which require the efforts of several ministries for their implementation, while their use encompasses many sectors of the national economy. For purely sectorial developments the ministerial conveyor is still working very poorly, but much more significant intersectorial inventions often remain "homeless," and we take care of them.

[Question] But how in practice are these principles being implemented in the work of the commission?

[Answer] Executives of the USSR State Planning Committee, the USSR State Committee for Science and Technology, the USSR Academy of Sciences, the USSR State Committee for Inventions and Discoveries, the USSR Ministry of Higher and Secondary Specialized Education, the All-Union Central Council of Trade Unions, and the All-Union Society of Inventors and Efficiency Experts are members of the commission. In the course of the work the proposals on inventions, which are to be considered at the meeting, are discussed and the group of ministries and departments, which should settle comprehensively all the questions on the implementation of an invention, and the ones, which will use it at their enterprises, is specified. After preliminary study by the State Planning Committee and the State Committee for Inventions and Discoveries the question is submitted to the meeting of the interdepartmental commission and executives of all the concerned ministries and departments are invited.

For example, the state of affairs with the use of radiation technologies based on commercial electron accelerators, which were developed at the Institute of Nuclear Physics of the Siberian Department of the USSR Academy of Sciences, was examined at the last meeting. The first models of such accelerators were developed more than 20 years ago. The production of small series has been organized at the pilot works of the institute, which is making it possible to set up pilot industrial production lines in various sectors of the national economy.

Irradiation with an electron beam gives many conventional materials new valuable properties, for example, resistance to cold and heat and strength. Coatings on ceramics are made strong and can replace natural marble when finishing buildings. Radiation helps to develop modified industrial rubber materials with memory of the shape. Sealing rings made from such materials are easily mounted, for example, when erecting the pipes of gas pipelines. Then it is sufficient to heat them, and they contract, reliably sealing the welded joint, where there is no plant insulation as on the remainder of the pipe. In elevators radiation reliably destroys pests of grain.

But so far the series production of accelerators has not been organized. Now the Ministry of the Electrical Equipment Industry will begin their series production starting in 1988 in Novosibirsk at the Sibelektroterm Production Association. While the Zavod imeni Vladimira Ilicha Production Association of the Ministry of the Electrical Equipment Industry will organize the series production of complete production lines for radiation treatment, which include automated loading and unloading devices.

On the other hand, assignments on the organization of the large-tonnage production of radiation-modified materials, including starting in 1987, have been included in the state plans of the USSR Ministry of the Chemical Industry and the USSR Ministry of Light Industry. More than 10 ministries should take additional steps on the increase of the volumes of use of radiation technologies based on electron accelerators. During the 12th Five-Year Plan three large elevators with the radiation disinfection of the grain will be put into operation.

The USSR State Committee for Prices jointly with interested ministries and departments has been ordered to examine the question of establishing stimulating prices for commercial accelerators and radiation-modified products with allowance made for their high quality.

Scientists of the Institute of Nuclear Physics of the Siberian Department of the USSR Academy of Sciences, seeing that their development, which was devised on the basis of a large number of inventions, has now finally gotten onto the state conveyor of introduction, have assumed the obligation to develop a new generation of commercial accelerators. The State Committee for Science and Technology should formulate and approve in 1986 an all-union scientific and technical program for 1986-1990 on this problem. While for its implementation it is planned to prepare proposals for the USSR Council of Ministers on the establishment of an interbranch scientific technical complex on the basis of the Institute of Nuclear Physics of the Siberian Department of the USSR Academy of Sciences. The conducting and the coordination in the country of basic and applied research and the performance of experimental design work on the development of new generations of electron accelerators, technologies based on them, and radiation-modified materials, on the production of prototypes, and on their bringing up to series production jointly with ministries and departments should be its task.

It has been recommended to the executives of ministries, departments, associations, and enterprises to set up temporary collectives and to establish higher salaries for the immediate performers of the work for the acceleration of the introduction of radiation technologies in the national economy.

As you see, the commission is approaching comprehensively the solution of the problem and is trying to encompass the entire set of tasks which have to be accomplished. And the value of the inventions, with which we are dealing, justifies every effort. Thus, the use of radiation technologies during the 12th Five-Year Plan, according to the calculations of specialists, should yield an economic impact of more than 1 billion rubles. And the scientific

production base for an impact of many billions of rubles during future five-year plans will be established.

[Question] Are there special monetary funds and material resources for the acceleration of the introduction of inventions at the disposal of the commission or does everything rest only on the official possibilities of the members of the commission?

[Answer] The main lever that we use is the right to include assignments in the state plans. In our planned economy this is a powerful lever. At the preliminary stage of the preparation of questions we use the method of persuasion of ministries and departments, while, of course, approaching their possibilities realistically. But after the decision of the commission the method of compulsion comes into force.

For example, the Ministry of the Electrical Equipment Industry for various reasons was not able for a long time to begin the production of lighting units with slotted light guides, which were developed at the All-Union Scientific Research Institute of Lighting Engineering of this ministry. But these are very efficient resource-saving units. Instead of tens of bulbs in large rooms it is possible to install just two. The light will "run," being reflected from the internal surface of the films. It has been calculated that the production of 20,000 such lighting units replaces 380,000 conventional lamps. The consumption of materials is reduced to one-fourth to two-fifths, electric power is saved. The production of units with slotted light guides has been included by a separate line in the 1987 state plan for the Ministry of the Electrical Equipment Industry.

The chiefs of the majority of departments of the USSR State Planning Committee, who know well the state of affairs in ministries and always can divert groundless objections or suggest the correct solution, are members of our commission. We are directing serious attention to the export of our equipment. Thus, the pneumatic drifts, which were developed at the Institute of Mining of the Siberian Department of the USSR Academy of Sciences for the trenchless laying of pipes, eliminate the digging of trenches, sharply increase the rate of work, and, therefore, have a large demand on the world market, in spite of the fact that we have sold licenses to a number of countries. Now their production is being increased in order to completely meet the demand.

I should note that the commission does not always succeed in convincing ministries of the need for the introduction of valuable inventions. Thus, for example, the Ministry of the Chemical Industry so far does not want to change over to the anthraquinone method of producing hydrogen peroxide and monocarboxylic acids for the oil-free production of varnishes and paints. The entire world is using this resource-saving invention, but the Ministry of the Chemical Industry has stubbornly refused: we have an organized operating works--why should we change it? Although it is clear that the new technology is more profitable and it is necessary to change over gradually to it. The commission proposed to the Ministry of the Chemical Industry to return to this question.

So that not everything is going ideally smoothly. This is understandable. For it is necessary to alter not only established technologies, but also human psychology. And propaganda and the assistance of the scientific and technical community are playing an enormous role here. When the commission dealt with the technology of the heat treatment of parts with the use of a water-polymer quenching medium, the Central Council of the All-Union Society of Inventors and Efficiency Experts at one of the enterprises organized a school, at which everyone wishing to could become convinced of the value of the method and borrow the advanced know-how. As a result with the agreement of all 11 machine building ministries assignments on the introduction of this technology, which increases the quality of items and eliminates the use of mineral oils, ensures fire safety, and improves working conditions, were included in the 1986 state plan, and the extensive use of the valuable invention of a large group of specialists will be developed already during this five-year plan.

[Question] Anatoliy Antonovich, in its 1.5 years of existence the interdepartmental commission has held only three meetings, at which seven important developments, in which several tens of major inventions were implemented, were examined. But this is all the same not much. It is clear that the change of management and the change of the composition of the commission had an effect. But do you believe that the commission for the acceleration of introduction needs to speed up the pace of work and to meet if only once a quarter?

[Answer] We are taking only the first steps and intend to broaden the scale of work of the commission. But we will not change the basic principles--as before only the most important inventions will remain at the center of attention. Folk wisdom justly states that "if you chase two rabbits, you will not catch one." The preparation of each meeting requires enormous preliminary work. Indeed, for the present for all the members of the commission the work on it is an "addition" to the basic functions.

In my opinion, the establishment of interdepartmental commissions in all the union republics would be of greater importance. For the present they exist only in Belorussia and Georgia and one is being organized in Kazakhstan. It is up to the other republics, and first of all the largest--the RSFSR. The republic commissions could not only accelerate scientific and technical progress in their regions, but also prepare suggestions for the USSR State Planning Committee.

But, of course, the commissions of this sort should not "shoot at sparrows from a cannon." For reorganization is under way in the country, and the overall attention to inventions is increasing. Jointly with the State Committee for Inventions and Discoveries the State Committee for Science and Technology is now formulating a special plan of the preparation of important inventions for introduction. It is impossible to recommend many of them immediately for production--somewhere it is necessary to conduct additional research, in another case to carry out design development, in a third case to carry out the production of the prototype and tests. Now more than 50 assignments on the use of over 200 important inventions have already been included in the five-year plan of preparation.

At the same time economic levers are also being put into effect. We are working in close contact with the Commission for the Improvement of the Economic Mechanism attached to the USSR State Planning Committee. And we are jointly planning steps in order to stimulate in general the introduction of all inventions. The situation is gradually changing, and now enterprises are independently beginning to display more and more interest in the use of inventions. This trend will intensify with the new year, when the majority of sectors will change over to the new conditions of management, while some will change over to self-financing. So that the process of accelerating the introduction of inventions is being intensified both from above and from below. This will unquestionably be of enormous benefit to our country.

6289
CSO: 1814/50

LITHUANIAN LASER, ARTIFICIAL CRYSTALLINE LENS RESEARCH DESCRIBED

Vilnius SOVETSKAYA LITVA in Russian 23 May 86 p 4

[Article: "In Institutes and Laboratories"]

[Text] Physicists Conduct a Search

> A trillionth of a second is the speed of light pulses emitted by the Viyuka laser, which was created at the Institute of Physics of the Lithuanian SSR Academy of Sciences and fabricated at that the pilot plant of laser and electronic equipment attached to this institute.

One such device has been supplied to the Institute of Physics of the Belorussian SSR Academy of Sciences, where by means of it ultrahigh-speed processes in complex molecules will be studied, a system of light guides will be developed, and a search for materials needed for electronics will be made.

"We have been collaborating with Belorussian physicists for 10 years and this creative friendship is producing good results," states Candidate of Physical Mathematical Sciences Donatas Butkus, scientific secretary of the Institute of Physics. "Now, it can be said, these contacts have reached a new level--the stage of joint work has begun. We are jointly creating devices for the spectral analysis of materials. These devices will be applied in chemistry, microbiology, and other sectors of the national economy, where itis planned to introduce effective technologies during the current five-year plan."

At the same time, highly valuable scientific innovations are also being exchanged. Thus, Lithuanian physicists plan to use under the conditions of the republic the methods of studying water pollution, which were developed at the Institute of Physics of the Belorussian SSR Academy of Sciences. While the lidar developed by us, by means of which air pollution is monitored, and the method developed in Vilnius, which makes it possible to prolong by a laser beam the life of metal parts, have interested the scientists of the fraternal republic.

An Eye With an Artificial Crystalline Lens

Ophthalmologists of the clinic attached to the Kaunas Medical Institute have performed an operation on the implantation of a crystalline lens of the eye.

The vision of retiree A.F., a female resident of the city, had become weaker. After careful examination, specialists discovered a cataract and were preparing to remove the cloudy crystalline lens. Following such an operation, which they have been performed for many years at our clinics, the patients' future is usually as follows: thick, heavy eyeglasses with lenses ranging from 10 to 13 diopters. For a long time this was the only way of helping cataract victims. At present in Moscow, at the Scientific Research Center of Eye Microsurgery, which Corresponding Member of the USSR Academy of Medical Sciences S.N. Fedorov manages, a new cataract treatment method: the implantation of an artificial crystalline lens in the eyeball, has been proposed and has been introduced widely in the country. The pilot plant of the institute annually produces more than 10,000 original artificial lenses. They have been patented in Great Britain, the Netherlands, Italy, the Federal Republic of Germany, and other foreign countries. The artificial crystalline lenses, which are produced from polymers of a certain composition only 250 microns thick, are lighter and more transparent than the human eye's natural crystalline lens.

The microsurgical operation for the implantation of an artificial crystalline lens usually lasts about 1 hour. The preparatory stage takes longer: the optimal version of the lens must be selected for each patient. Here, ophthalmologists are helped by specialists in ultrasound and electrophysiology.

Kaunas ophthalmologists have learned these secrets in Moscow, at the Center of Eye Microsurgery. Their colleagues have also supplied them with the necessary surgical instruments and lenses.

And now an independent step have been taken: not only was the sick cloudy crystalline lens of the eye of the female resident of Kaunas removed, but an artificial lens was also implanted. Professor E. Daktaravichene, head of the Eye Diseases Chair of the Kaunas Medical Institute, and physician A. Ambrazyavichene performed the operation with the aid of a microscope.

According to specialists, the implantation of an artificial crystalline lens will henceforth be widely applied in Kaunas to patients suffering from senile and traumatic cataracts, of course, if any other disorders in their body do not hinder microsurgical measures. Scientific research is also being conducted in this area.

5013
CSO: 1814/57

INTRODUCTION OF SELF-PROPAGATING HIGH-TEMPERATURE SYNTHESIS

Moscow IZVESTIYA in Russian 3 Oct 86 p 2

[Article by IZVESTIYA science observer B. Konovalov under the rubric "New Equipment: From the Idea to the Series": "Solid Flame. The Story of the Fate of a Soviet Invention That Outstripped World Practice"]

[Text] In the now distant year of 1967 a group of associates at the Institute of Chemical Physics of the USSR Academy of Sciences--A. Merzhanov, I. Borovinskaya, and V. Shkiro--discovered the phenomenon of self-propagating high-temperature synthesis (SHS) which is popularly called the "solid flame."

Traditionally these kinds of processes occurred in furnaces, in which a high temperature was maintained and the reaction in a mixture of components immediately occurred throughout its volume.

And then it turned out that the process can be carried out in a completely different way. It is necessary to take the mixture of necessary components and to heat its surface. Then the synthesis reaction begins on a small top layer. The heat given off in this case warms the neighboring layer, that layer warms the next one.... And a self-propagating process, which occurs without an external heat supply, originates--only initial momentum, which can be given by a large number of means--an electric current, a laser, hot gas...--is needed. An incandescent zone with a temperature of 3,000 to 3,500 degrees forms behind the front of the solid flame in which "combustion" takes place without oxygen and without the release of gases. The speed of advance of the combustion front can reach 20 centimeters per second. This affords the most abundant possibilities for the practical application of SHS technology and promises a saving of many millions of rubles in case of its large-scale use. Therefore, a special meeting of the Interdepartmental Commission for Questions of the Acceleration of the Introduction of Especially Important Inventions in the National Economy attached to the USSR State Planning Committee was recently devoted to it.

At the meeting it was said that SHS makes it possible to solve by simple methods the problems, which are too difficult for other technological processes, to improve the quality of items, and to save substantial resources. Estimates show that as compared with traditional technologies one-fifth to

one-third as many materials are required and labor productivity and the reliability of items increase by several fold.

Professor A. Merzhanov, supervisor of the work on self-propagating high-temperature synthesis (SHS), told me back before the meeting that the attitude toward the discovery passed through three stages. At the first stage scientists in unison admired the process and in no less unison asserted that this cannot be--there is some kind of trick here, the combustion of solid substances should not occur so quickly without oxygen. At the second stage they began to say that the process is splendid and fine, but this is an exotic scientific thing, which, apparently, it will not be possible to use in practice. While at the third stage (which has lasted to this day) the persistent process of demonstrating the effectiveness of SHS took place. From all corners they said to the enthusiasts: do this, show that, calculate the economic impact. And they did it, demonstrated it, and showed it jointly with many sectorial institutes at enterprises.

Now several tens of organizations are cooperating with the Macrokinetics Department of the Institute of Chemical Physics of the USSR Academy of Sciences--the father of SHS. The problem has been acknowledged. The Scientific Council of the USSR State Committee for Science and Technology for the Problem "The Theory and Practice of the Processes of Self-Propagating High-Temperature Synthesis" has been established.

Industry is also turning to face SHS. During the past five-year plan commercial introduction was organized in several places and an enormous reserve for the future was prepared. Several hundred different inorganic compounds and materials were devised by the SHS method, more than 30 different technological procedures were developed. And still the overall scale of the use of SHS for the present is small can could be much greater....

Unfortunately, not everyone understands that it is possible by the new method not only to synthesize new materials, but also to synthesize technological processes. The obtaining of finished items made from inorganic materials usually reduces to three stages. At the first stage it is necessary to obtain the source components. At the second it is necessary to develop a material from them. While at the third it is necessary to convert it into an item.

By means of SHS it is possible to obtain simultaneously finished items and materials, to apply any coatings, to carry out face hardening and much more....

But the novelty of the process and the lack of automated equipment and series-produced production lines for SHS are checking commercial use. The large-scale use of SHS requires the quickest solution of the problem mainly by the Ministry of Chemical and Petroleum Machine Building and the Ministry of the Machine Tool and Tool Building Industry, as well as by the Ministry of Heavy and Transport Machine Building and the Ministry of the Electrical Equipment Industry.

Of course, you do not get anything for nothing. SHS is not "manna." It requires investments and the change of the customary technology and, what is

the main thing, psychology, including the elementary recognition of the merits of an innovation.

But it must be noted that the 20 years of dedicated labor of enthusiasts, unfortunately, so far have not received proper recognition at the USSR Academy of Sciences.

Back in December 1985, taking into account the particular importance of the discovery, a decision was adopted on the organization of an interbranch scientific technical complex (MNTK), which includes a large number of institutes, special design bureaus, and industrial enterprises. But the work is being developed very slowly.

Vice President of the USSR Academy of Sciences Academician K. Frolov at the meeting recognized this situation to be abnormal. In his opinion, the USSR Academy of Sciences would be quite capable with the assistance of the State Committee for Science and Technology of opening an institute for SHS, which the country needs. If it is necessary to free personnel for this, it would be entirely possible to close inefficiently working institutes. And this is a very sober and topical opinion. The USSR Council of Ministers recently criticized bluntly the state of affairs in sectorial science. Unfortunately, in academic science matters are also far from shining.

The management of the USSR Academy of Sciences from all lofty platforms has been condemning the conservatism and sluggishness of ministries and departments. But when the government ordered it to assume specific responsibility for the successful development of several main intersectorial directions, in reality we saw the same sluggishness. In the past 9 months an official general director of the Termosintez Interbranch Scientific Technical Complex has not been appointed.

But meanwhile abroad SHS has already received extensive recognition. It must be said that there as well they at first considered SHS to be an exotic thing. When the Japanese firm of Chori was about to purchase a license, it invited 20 professors from various firms, they said unanimously--this is very interesting, but it will not work in industry. Now they have understood that it will work. And in Japan, the United States, and other countries work in this area is being rapidly developed, the largest firms are being enlisted, and they are seeking their own path.

Our discovery is protected by patents in the capitalist countries, but not fully. Deputy Chairman of the State Committee for Inventions and Discoveries Yu. Pugachev in his statement noted that in practice 49 inventions with respect to SHS have already been tested and are being used in our country, but only 8 have been patented. Moreover, the effect of the basic patents ends in 1990. But so far, in spite of the desire of a number of firms, we have not sold a single license owing to the inflexible policy of the Patent and Licensing Department of the Presidium of the USSR Academy of Sciences. We are also not dealing in ready-to-use technology. Patents, after all, are not an end in themselves, as was correctly indicated in the interdepartmental commission. This is an invitation to the entering into commercial relations. But if this does not exist, the money for patenting is being wasted.

We now often say that our new equipment should be raised to the world level. But here is a case when, on the contrary, the world level needs to rise to Soviet equipment and technology. So let us use fully all the advantages of this situation.

At recent meetings the interdepartmental commission examined two important inventions--the commercial accelerators of the Institute of Nuclear Physics of the Siberian Department of the USSR Academy of Sciences, on the basis of which many advanced radiation technologies are being developed, and SHS. In both cases we see that the question of creating the conditions for the commercial use on the world market of the most important inventions is being posed only 20 years after the performed priority work. It is impossible to call such a situation normal. We are losing our advantages.

It is finally time to understand that the fruits of scientific thought are not less valuable than timber, petroleum, and gas.

It is time to take into account not only the saving, which the use of scientific discoveries yields, but also the harm, which their lack of use does to the country, then, perhaps, the matter will make headway.

First Deputy Chairman of the USSR State Planning Committee A.A. Reut, who chaired the meeting of the interdepartmental commission, asked one of the speakers:

"Has SHS begun to self-propagate in the sector or is it proceeding as before under pressure?"

"Alas, only under pressure," was the response.

The process of introducing scientific achievements is a complex, multistage one. And here far from everything depends on the upper levels of management. It is also important to create the conditions and to put to use economic levers so that all enterprises without orders and pressure would quickly use everything best, to which scientific thought gives rise.

6289
CSO: 1814/50

IMPLEMENTATION OF CEMA PROGRAM OF S&T PROGRESS

Moscow TEKHNIKA I NAUKA in Russian No 7, Jul 86 pp 31-32

[Article by Doctor of Technical Sciences Professor V.F. Leontyev, head of the Department of Scientific and Technical Cooperation of the CEMA Secretariat, under the rubric "By the Course of Socialist Integration": "To New Levels"; first paragraph is TEKHNIKA I NAUKA introduction]

[Text] Questions of the implementation of the Comprehensive Program of Scientific and Technical Progress to 2000 (KP NTP) were examined at the 34th meeting of the CEMA Commission for Scientific and Technical Cooperation. Doctor of Technical Sciences Professor V.F. Leontyev, head of the Department of Scientific and Technical Cooperation of the CEMA Secretariat, tells how what has been planned is being realized.

A quite short time has passed since the day of the signing of the Comprehensive Program of Scientific and Technical Progress (KP NTP). When it comes to such an imposing program, which is intended for 15 years and envisages the close cooperation of 10 states in the areas which are the basis for revolutionary changes in science, technology, and production, this segment of time is infinitesimally short. Nevertheless it is already possible to tell about what it has been possible to do and on what they are now working in the member countries of the Council for Mutual Economic Assistance. Moreover, there has not yet been such an intense and productive time segment.

First of all it should be noted that very important problems, on which the future of scientific and technical cooperation within CEMA depends, are being worked on collectively. They are of a technical (technological) and organizational nature. Moreover, in many instances we are proceeding as trailblazers and "are developing virgin lands," since in all the preceding, nearly 40-year practice of CEMA there has been nothing of the sort.

The Comprehensive Program as if tops the existing building of multilateral cooperation within CEMA with a new "strategic story." It is a question, as I said, of an unprecedentedly long period--to the turn of the third millennium. Second, it is a question of the strict selection from all the diversity of themes and problems of those main directions of scientific and technical progress, the joint achievements in which will create the necessary prerequisites for radical changes in the development of productive forces, the

qualitative reorganization of the economy, and the increase of the well-being of the peoples of the states of the socialist community.

General Secretary of the CPSU Central Committee M.S. Gorbachev in the Policy Report of the CPSU Central Committee to the 27th party congress called the implementation of the Comprehensive Program an extraordinary undertaking which requires a profound party approach. For its implementation and the changeover of the CEMA countries to a coordinated scientific and technical policy, he noted, changes in the headquarters of socialist integration--the Council for Mutual Economic Assistance, more attention to economic levers, initiative, and socialist enterprise, and the involvement of labor collectives in this process are necessary.

In this connection the particular interest, care, and responsibility, with which the fraternal countries are approaching the preparation of the Statute on the Main Organization Which Is the Coordinator of the Work on the Problem of the Comprehensive Program of Scientific and Technical Progress--in short, on the rights and duties of the specific performers, on whose shoulders the work during the coming three five-year plans will rest--are becoming understandable. A similar "tool of interaction" has not yet existed in our history. The main organization which is the coordinator for the problem of the Comprehensive Program of Scientific and Technical Progress (I will recall that in all 93 problems were selected in all 5 priority directions) will be the basic organizing and coordinating unit of scientific, technical, and production cooperation on the development and introduction of new equipment, technologies, and materials. It is responsible for the technical level and quality of the product being developed, its conformity to world analogs, the observance of the established deadlines, and extensive use in the national economy.

The main organization (GO) should draw up a feasibility study of the performance of the work with the indication of the specific anticipated results, parameters, and the time of their receipt, the approximate amounts and cost, forms and procedure of the performance of this work, and the conditions of financing. For this the main organization formulates a detailed program of cooperation on the problem as a whole over the entire science-technology-production-marketing cycle. In consultation with interested CEMA member countries each of these "flagships" can act as the responsible performer for all the specific questions of the given problem. But the very logic, the point of the international division of labor, and the advantages, which follow from the specialization and cooperation of efforts, dictate the need for the analysis of the problem into individual components--themes--and into even smaller ones--assignments. The responsible performers and coperformers will "make" them. Everything will depend--in each specific case--on the difficulty of the problem and the availability of a modern scientific and technical base, since the technical perfection of items, as the modern science of science and the practice of leading institutes and design bureaus shows, depends on its level and capacity.

The main organizations for the problems and the main organizations, which are the responsible performers for themes and assignments and coperformers, will establish close interrelations. They have to elaborate jointly proposals on

the use in the national economy of the interested countries of the latest scientific and technical achievements and production know-how, which were obtained by the sections, on the development of special apparatus and equipment, on the acquisition of scarce materials, on the purchase of licenses, and so on. They should also not forget about the development of the corresponding CEMA standards, other standard technical documents, regulations, methods, and means of measurements.

I would like to stress that in the increase of the efficiency of the activity of the main organizations a special role belongs to direct contacts with the coperformers. At the 41st, extraordinary meeting of the CEMA Session it was indicated anew that all the countries are convinced of the need for the creation of the most favorable conditions--both economic and organizational--so that institutes, design bureaus, scientific and technical centers, and associations would face each other directly. In the end the success of everything planned will depend on this. The contacts of the main organization for the problem with coperformers at the first, planning stage are exceptionally important. One of the advanced forms, as was noted at the session, is joint scientific production associations, enterprises, and scientific collectives. It is presumed that in the detailed programs, which are presently being formulated by the main organizations, this question will find appropriate reflection.

In conformity with the decree of the CPSU Central Committee and the USSR Council of Ministers of 1985 on measures on the implementation of the Comprehensive Program competent organs--the State Committee for Science and Technology, the ministries of foreign trade, finance, and justice, the USSR Permanent Representation attached to CEMA--recently specified the procedure of activity, the rights, and the responsibility of the Soviet main organization for the problem of the Comprehensive Program of Scientific and Technical Progress. Now similar documents on the main organizations for individual themes are being drawn up in the other CEMA member countries. If we summarize, the main responsibility for the state of affairs at all stages has been assigned to the Soviet main organization for the problem within the country. It has been afforded the most extensive opportunities for the accomplishment of the assignments, including the right to conclude on its own behalf with partners from the CEMA member countries contracts for the performance of research and experimental design work, the production of prototypes of products, and so on.

Leading collectives have become the Soviet main organizations. They also include the quite recently established interbranch scientific technical complexes (MNTK's), such as the Biogen, Laser Technology, Membranes, Light Guide, and other complexes. Tens of scientific research institutes, design bureaus, and enterprises of various departments are included in each such interbranch scientific technical complex. This is a powerful impact hammer, which is capable of solving the most difficult problems of science and production. And its performance of the role of the leader for the problem of the Comprehensive Program of Scientific and Technical Progress is obviously impressing our partners. State systems of the management and monitoring of the implementation of the Comprehensive Program of Scientific and Technical Progress, which are headed, as a rule, by deputy chairmen of the councils of

ministers, are already operating or are being formed in the USSR and a number of other CEMA member countries.

And now about the progress of the fulfillment of the Comprehensive Program. As is known, the implementation of the Comprehensive Program of Scientific and Technical Progress is being accomplished through a set of interconnected agreements. Back at the 41st, extraordinary meeting of the session the leaders of the delegations signed the General Agreement on Multilateral Cooperation in the Development and Introduction of Computer-Aided Design Systems (SAPR's), the General Agreement on Multilateral Cooperation in the Development, Production, and Operation of the Unified System of Light Guide Means of Data Transmission, and the Agreement on the Founding of the Interrobot International Scientific Production Association. In addition to these directions, at present a number of new ones, including on microprocessor equipment and new materials and technologies of their production and processing, on biotechnology, and many others are being prepared.

In the basic provisions of the Comprehensive Program of Scientific and Technical Progress it is stated that the CEMA member countries are posing a truly revolutionary task--to achieve the highest level in the most important directions of scientific and technical progress. It is impossible to ensure this, if the Comprehensive Program is regarded as a set of individual, although very important, problems. Life itself suggests: the implementation of the Comprehensive Program is possible only in case of the observance of rigid laws, if you wish "the technology of progress," which is based on the use of the most advanced production technology and qualitatively new equipment and materials. The failure to comply with these demands, as national and international practice attests, in most cases hinders the achievement of the desired indicators and characteristics and leads to large unproductive expenditures of time and assets, and at times to defective output. Neither is tolerable at the present stage. The attainment in science and technology of the highest world levels and the shortening of the time of research and development are being achieved by means of the enlistment in the work of the leading institutes and design bureaus of the different CEMA member countries. The use of new high-quality components, which surpass the already existing ones or are being developed "individually" in some one country, is also of great importance for the development of equipment and technology of a new generation.

The Comprehensive Program is an extremely important document, which makes it possible to "coordinate" both the long-term scientific and technical plans and the long-term production plans of the CEMA member countries and to unite their efforts for the rapid accomplishment of the most important strategic tasks which face them at the present stage. Therefore, both the countries and their organs and the international economic organizations and international management organizations, which have been established by them, at present are doing everything that depends on them for the rapid and efficient fulfillment of the Comprehensive Program of Scientific and Technical Progress.

7807
CSO: 1814/4

PROBLEMS OF INTRODUCING BELORUSSIAN SCIENTIFIC ACHIEVEMENTS

Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 2, Feb 86 pp 22-25

[Article under the rubric "The Union of Science and Production": "From Development to Introduction"; first four paragraphs are NARODNOYE KHOZYAYSTVO BELORUSSII introduction; last four paragraphs are NARODNOYE KHOZYAYSTVO BELORUSSII conclusion]

[Text] Apparently, there is no need to recall the world famous achievements of Soviet science and the successes of one of its leading detachments--science of Soviet Belorussia. But the introduction of the achievements of scientists into practice for the time being lags most often.

In the end precisely the losses on the path from development to introduction explain the fact that we cannot buy at times goods of the quality we need, that many enterprises often cannot meet their own needs for productive, reliable domestic equipment, and that the very time of the introduction of innovations in production far from always conforms to the dictates of the times.

We invited representatives of academic science and economic and planning organs of the republic to a discussion of this most important interdepartmental problem. Taking part in the discussion are: Academician of the USSR Academy of Sciences, President of the Belorussian SSR Academy of Sciences, and Hero of Socialist Labor Nikolay Aleksandrovich Borisevich; Chief Scientific Secretary of the Presidium of the Belorussian SSR Academy of Sciences Academician Vladimir Antonovich Pilipovich, director of the Institute of Electronics of the Belorussian SSR Academy of Sciences; Corresponding Member of the republic Academy of Sciences Stanislav Aleksandrovich Astapchik, director of the Physical Technical Institute of the Belorussian SSR Academy of Sciences; Doctor of Technical Sciences Oleg Vasilyevich Berestnev, director of the Institute of Problems of the Reliability and Durability of Machines; Doctor of Economic Sciences Stanislav Grigoryevich Galuza, director of the academy's Institute of Economics; Gennadiy Nikolayevich Artyushevskiy, chief of the Science and Technology Department of the republic Council of Ministers; Leonid Timofeyevich Pozdnyakov, chief of the Science and Technology Administration of the Belorussian SSR State Planning Committee.

Journalists Zoya Latun and Ionas Laurinavichyus conduct the round table.

In the Main Direction

[Question] Beginning the discussion, we should apparently proceed from the real achievements and possibilities, which both our science and our national economy have. To what extent do these possibilities conform to the task of doubling the production potential of the countries in case of its radical qualitative updating? The task, which was formulated in the draft of the new version of the party Program and in the draft of the Basic Directions of USSR Economic and Social Development for the 12th Five-Year Plan and the Period to 2000.

N.A. Borisevich: Indeed, during the coming 15-year period a 2.3- to 2.5-fold increase of labor productivity in social production is envisaged. The achievement of such a pace is impossible without the cardinal acceleration of scientific and technical progress on the basis of the latest achievements of science and without the quickest implementation of the scientific reserve which we have. Not by chance in the draft of the new version of the CPSU Program is this issue described as vital in the economic strategy of the party.

The Belorussian SSR Academy of Sciences has always attached great importance to the introduction of the achievements of science in practice. During the just completed 11th Five-Year Plan we introduced annually about 300 new developments and as a result obtained an economic impact of more than 800 million rubles. Nevertheless, many developments for some reasons or others remained unintroduced. Taking into account that the scientific reserve yields the greatest return--incidentally, precisely this was spoken about at the June (1985) conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress--we examined the proposals of the institutes of our academy and submitted to the Belorussian SSR Council of Ministers 45 developments for introduction in the republic, as well as 50 proposals to the USSR State Planning Committee for large-scale introduction in the country. People may ask: Why have so many unintroduced developments accumulated? A number of reasons exist here, but I regard as the main one the not always clear desire of production of accept some developments or others. Then, on the other hard, a portion of the developments did not have adequate completeness, therefore, their modification was required.

In general it is necessary to undertake even more, to do more in order to speed up the introduction of scientific developments in practice.

The main thing, to which the institutions of our academy and its presidium have devoted attention in recent times, is the drafting of the plans for the 12th Five-Year Plan. Three categories of plans have been drafted. First, 23 programs of basic research in the natural, social, and technical sciences have been specified. This is entirely explicable: the Academy of Sciences should be concerned first of all about the development of basic research, for on its basis it is possible to expect the development of fundamentally new technologies and new equipment.

immediate interests of production are formulated and formed precisely in the ministry as the responsible unit for the output of one advanced product or another. The assignment is specified and transmitted through its sectorial science to basic science. The client, the "stockholder," and the user in one person. What else can science wish? Moreover, it is necessary to stress that these programs are under the closet control both of science and production and of the republic State Planning Committee. Precisely for this reason we will strive to strengthen this form during the new five-year plan.

Of the other promising forms of contact of academic science with ministries and departments I want to name the laboratories or other subdivisions of dual subordination. This unit directly links into a unified whole sectorial and basic science. I can name, for example, the sectorial laboratory which was set up by us jointly with one of the union ministries and the Institute of Technical Cybernetics. The introduction of the results of its work on the problems of computer-aided design in the area of machine building annually yields an impact of about 10 million rubles. Incidentally, we propose to go to superior organs with a suggestion on the organization of a center for computer-aided design systems in machine building on the basis of the same Institute of Technical Cybernetics.

The work within the framework of scientific production associations of the Belorussian SSR Academy of Sciences, which operate as a voluntary service, with the BelavtoMAZ Production Association (Avtofiztekh), with the tractor plant (ANITRA), and with enterprises of Gomel (ANGOM) will undergo further development during the new five-year plan. Other forms of the improvement of the contacts of science with production, which are called upon to increase the efficiency of the use of our developments, are also envisaged.

[Question] Oleg Vasilyevich, the Institute of Problems of the Reliability and Durability of Machines, by virtue of the nature of its work, more often than others has to meet with production workers. What difficulties arise when introducing scientific developments in production? What conclusions is it possible to draw already today?

O.V. Berestnev: As Vladimir Antonovich has already said, we have developed relatively well the system of the introduction of scientific developments at individual enterprises of the country and republic. And for this reason we directly transfer technological solutions to these enterprises, develop these innovations jointly with them, and bring them up to pilot introduction at one enterprise or another. In 1984 alone in accordance with the results of the research of our institute more than 20 scientific developments with a total economic impact of 7.8 million rubles, including 5.6 million rubles in our republic, were introduced.

For example, at the Belorussian Motor Vehicle Works a new, advanced technology of the chemical and heat treatment of gears was introduced. A substantial increase of their durability was achieved. A large batch of tractors of the Chelyabinsk Tractor Plant has already been equipped with the finished transmissions, which were developed with the participation of our institute and have an increased load-carrying capacity and durability.

Priority importance is being attached to machine building. In our list three major programs are devoted to it. One of them, for example, is "The Scientific Principles of the Automation of Processes in Machine Building and the Assurance of the Reliability of Machines and Complexes of Them."

Among the programs, which are devoted to technological questions, I can name "The Scientific Principles of the Development of Resource-Saving Technologies and Equipment for the Complete Use of Peat, Sapropel, and Oil Shales."

In short, these 23 comprehensive programs encompass all the basic directions which were specified by the April (1985) CPSU Central Committee Plenum.

The second category of plans is the plans on the most important scientific problems. For the priority programs, about which I have already spoken, do not encompass all aspects of the activity of the Academy of Sciences and VUZ and sectorial science of the republic in the area of basic research.

And, finally, the discovery of completely unknown phenomena, mechanisms, processes, and laws is all the same the most important thing in science. We should use even the glimmers of some new ideas, which, perhaps, at first glance seem abstract. Therefore, the plans of the institutes will also contain research themes. Scientific and technical programs are playing an important role. The Belorussian SSR State Planning Committee is coordinating the work on their implementation. Now about 15 comprehensive goal and more than 20 scientific, technical, and economic programs have been submitted for consideration to republic planning organs. The Belorussian Academy of Sciences is participating in the formulation for the 12th Five-Year Plan of more than 20 of them.

[Question] What steps are being taken for the introduction of these developments in practice?

N.A. Borisevich: As is known, a council for the promotion of scientific and technical progress has been set up under the republic CP Central Committee. Similar councils are also operating under the oblast party committees. On its part, the Academy of Sciences has established in oblast centers groups for the coordination of research and the promotion of the introduction of developments of the academy in industry and in agriculture. When the process of planning has been completed, we will make changes in the structure of institutes in conformity with the plans and with out programs. Moreover, temporary creative collectives will be set up for the most important problems.

I could also speak about the many means which we are seeking in order to actually increase cardinally the efficiency of the work of the academy, as well as of republic science as a whole. The coordination of the efforts of academic, VUZ, and sectorial science and the development of the system of the planning and introduction of developments in practice, for example, are an important task. For this purpose the Belorussian SSR State Planning Committee, the Academy of Sciences, and the Ministry of Higher and Secondary Specialized Education adopted a decision on the elaboration of a set of measures which are aimed at the gradual transition from basic research to planning and design operations and to their introduction. We have discussed

and signed this set, and it will be the reference document when passing through the stages from scientific research to introduction.

[Question] The comprehensive goal programs, which Nikolay Aleksandrovich mentioned, are obliged for their appearance to the social need to sweep away departmental barriers when introducing the achievements of scientific and technical progress. What is being done in the republic in this direction?

L.T. Pozdnyakov: Yes, the method of the program management of the national economy in our republic, as has already been stated, has found extensive and effective application. The merit and usefulness of programs lie in the fact that they as if coordinate all the practical stages, beginning with scientific research and experimental design work and ending with the production and tests of prototypes. Well, since the scientific, technical, and national economic programs have been taken under state control, under the control of the Belorussian SSR State Planning Committee, here, as a rule, practically all the work is being completed in good time and with a high quality.

During the past five-year plan scientists and production workers of Belorussia implemented 53 republic scientific and technical programs and took part in 108 union programs. The assignments of these programs were fulfilled successfully, with a significant economic impact. During the new 5-year period Belorussia will take part in 33 new union programs, including such ones as "High Pressures," "Composite Materials," "Strengthening Technology," and others.

Among the nine republic national economic programs I would especially single out the Intensification Program--both with respect to the scale of the tasks being accomplished and with respect to the role of science in it. In general I can say that the Belorussian SSR Academy of Sciences will take part in 29 of the 38 republic scientific and technical programs. The anticipated economic impact from the introduction of its developments in production is about 400 million rubles.

New Forms for the New Content?

[Question] The qualitatively new tasks, which are being accomplished at present by science and the national economy of the republic, require, thus, the further improvement and development of the organizational forms of the interaction of science and production. Vladimir Antonovich, what is it envisaged to do in this direction during the 12th Five-Year Plan?

V.A. Pilipovich: The analysis of the already existing forms shows, and in this I agree with the other participants in our conversation, that scientific and technical programs, in which both academic and sectorial science and enterprises participate, are the most effective among such forms. In recent years the presidium of the academy has exerted much effort in order to broaden and strengthen such contacts. Now we are cooperating with more than 15 ministries and with many large enterprises of the country and republic. The listing of even a portion of the introduced innovations would take up here much time. Therefore, I will confine myself to the organizational aspect of the problem. Why is precisely this form the most promising? Because the

immediate interests of production are formulated and formed precisely in the ministry as the responsible unit for the output of one advanced product or another. The assignment is specified and transmitted through its sectorial science to basic science. The client, the "stockholder," and the user in one person. What else can science wish? Moreover, it is necessary to stress that these programs are under the closet control both of science and production and of the republic State Planning Committee. Precisely for this reason we will strive to strengthen this form during the new five-year plan.

Of the other promising forms of contact of academic science with ministries and departments I want to name the laboratories or other subdivisions of dual subordination. This unit directly links into a unified whole sectorial and basic science. I can name, for example, the sectorial laboratory which was set up by us jointly with one of the union ministries and the Institute of Technical Cybernetics. The introduction of the results of its work on the problems of computer-aided design in the area of machine building annually yields an impact of about 10 million rubles. Incidentally, we propose to go to superior organs with a suggestion on the organization of a center for computer-aided design systems in machine building on the basis of the same Institute of Technical Cybernetics.

The work within the framework of scientific production associations of the Belorussian SSR Academy of Sciences, which operate as a voluntary service, with the BelavtoMAZ Production Association (Avtofiztekh), with the tractor plant (ANITRA), and with enterprises of Gomel (ANGOM) will undergo further development during the new five-year plan. Other forms of the improvement of the contacts of science with production, which are called upon to increase the efficiency of the use of our developments, are also envisaged.

[Question] Oleg Vasilyevich, the Institute of Problems of the Reliability and Durability of Machines, by virtue of the nature of its work, more often than others has to meet with production workers. What difficulties arise when introducing scientific developments in production? What conclusions is it possible to draw already today?

O.V. Berestnev: As Vladimir Antonovich has already said, we have developed relatively well the system of the introduction of scientific developments at individual enterprises of the country and republic. And for this reason we directly transfer technological solutions to these enterprises, develop these innovations jointly with them, and bring them up to pilot introduction at one enterprise or another. In 1984 alone in accordance with the results of the research of our institute more than 20 scientific developments with a total economic impact of 7.8 million rubles, including 5.6 million rubles in our republic, were introduced.

For example, at the Belorussian Motor Vehicle Works a new, advanced technology of the chemical and heat treatment of gears was introduced. A substantial increase of their durability was achieved. A large batch of tractors of the Chelyabinsk Tractor Plant has already been equipped with the finished transmissions, which were developed with the participation of our institute and have an increased load-carrying capacity and durability.

The general-purpose gas plasma units for the application of strengthening coatings made of metallic powders, which were developed at the institute and were produced at the works of our special design and technological bureau, are operating efficiently at tens of enterprises of the republic. According to the certificates of introduction, an economic impact of several million rubles has been confirmed from the use of these units in the national economy.

All these examples show the interest of enterprises in the introduction of promising developments.

But when it comes to extensive sectorial and intersectorial introduction, we cannot boast of the same kind of successes. For the present only individual developments of the institute, and then with a considerable delay, are being introduced in the sectors or are receiving intersectorial introduction. We believe that, in addition to a number of objective factors, the lack of development so far in our country of a system of the large-scale introduction of scientific developments tells here.

L.T. Pozdnyakov: Owing to the traditionally formed and quite natural "division of labor" between academic and sectorial science sectorial scientific research institutes bear responsibility for everything that concerns the introduction of new items which subsequently become items of basic production. I have in mind the technical level of the developments being introduced, their efficiency, and the time of introduction. The possibilities of academic science in introduction are limited, since, as a rule, the series production of all items is brought to enterprises through the plans of ministries. In order to introduce one's own item in production, it is necessary to pass without fail through the planning organs of one ministry or another and union (if the enterprise is of union subordination) or republic (if the enterprise is subordinate to the republic Council of Ministers) planning organs.

It is here that one of the main problematic issues is seen, when our nondepartmental institutes--academic institutes, institutes of the Ministry of Higher and Secondary Specialized Education--even when developing advanced items on a good technical basis, on the basis of inventions and discoveries, items which in principle and potentially can yield some economic, technical, and social impact in the national economy, cannot organize their production in sufficient quantity. Having made several specimens and having shown one merit or another of an item, such institutes cannot, as a rule, turn directly to state organs for the purpose of introducing innovations in production. The attempts to penetrate the production sphere through sectorial scientific research institutes, as a rule, lead nowhere.

O.V. Berestnev: I want to say that in recent times the republic State Planning Committee has joined more and more actively in the solution of such a difficult problem as the large-scale introduction of scientific developments. It has been gathering tested proposals of the institutes of the Academy of Sciences and the Ministry of Higher and Secondary Specialized Education and has been sending these proposals of sectorial ministries and to the USSR State Planning Committee.

However, then the difficulties begin again for the institutes which advanced these proposals. We are forced to seek enterprises for the organization of the series production of new items or technological processes. As these enterprises we should show again the promise of our developments. Then jointly with these enterprise we should organize tests for the purpose of determining the production technology. And bring this development to the very end--up to the organization of full production at the manufacturing enterprise.

It seems to me that here specific proposals on the improvement of this means are also being outlined. The time has come for the USSR State Planning Committee and, perhaps, the Committee for Science and Technology to work more actively on the questions which are connected with the large-scale introduction of the scientific developments which have been devised at various institutes. The role of the State Planning Committee should be more significant, it should become decisive.

Moreover, it is also possible to shorten the path of developments to production by a means which is more accessible to us. Much work is now being performed on the development of the pilot experimental base directly at enterprises. The further development of such a base at institutes themselves is also necessary. This will make it possible to bring developments more rapidly up to the necessary level, up to condition. And, of course, these bases should be used for their immediate purpose, and not for the undoing of bottlenecks, as is all the same happening frequently today.

N.A. Borisevich: I believe that probably the greatest difficulty when introducing an academic development in the ministry is to "get by" the sectorial institute.... Here, in my opinion, there is something for the director of the Physical Technical Institute to say.

S.A. Astapchik: Yes, indeed. Introduction and development are different things. Both in the sense of the division of labor and in the organizational sense. It is necessary to orient academic science, and M.S. Gorbachev spoke about this, first of all toward basic research. It is necessary to use it more for global, remote aims, and not to impose upon it the functions which sectorial science should perform. And, incidentally, wherever sectorial science is coupled well with academic science--we have such experience--there the opportunity appears to study better and, hence, to use the specific nature of the enterprise and its product mix. But if there is no contact, it is difficult to expect success.

Now take Gomelselmash. There are many problems there. But why? Even organizationally there is no sector of plant science there. And it is very difficult to implement introduction, if no one is responsible for an innovation. Why is there no example for illustrating how at times sectorial science "withdraws into the background," shirking the solution of the most important problems at its own enterprise?

It is also possible to name other examples, both positive and negative. Although I will immediately say that in our joint work with enterprises there

are things which do not depend either on the scientific institute or on the production workers.

Here are two facts from our cooperation with the Lidselmash Plant. When it became necessary for the enterprise for modernize the forge, it found the opportunity: it duplicated itself 80 percent of the necessary equipment. The second fact. The enterprise is a leading one, but the foundry operates in accordance with the "Demidov" technology. They cast in the ground! Meanwhile our Mogilev Affiliate developed the simplest machining attachment for casting in metal, sliding, adjustable molds. The enterprise is very interested in these developments, but it cannot shut down the foundry! This is equivalent to the shutdown of an entire works. But time is needed, money is needed in order to "connect in parallel" the casting process.

These are, so to speak, objective reasons. But if we draw a general conclusion, it can be said: wherever mutual interest in the introduction of a development appears, everything goes well. In spite of the organizational and technological difficulties, both parties are finding common ground and are seeking common opportunities. If something does not match (I repeat, I do not mean the already mentioned objective reasons), hence, one of the parties in not interested in this.

Interest and Responsibility: Two Sides of the Same Coin

[Question] Nikolay Aleksandrovich, at the beginning of our conversation you mentioned the large number of developments of scientists, which for the present have not been introduced, including unfinished developments. In this connection the question, first, of the criteria of the quality of some developments or others, which are recommended for introduction, and, on the other hand, of the interest of scientists and scientific organizations as a whole in the introduction of their developments arises.

N.A. Borisevich: I want to say that it is a matter of honor of the scientist to see the fruits of his labor realized in practice. This is also evaluated materially in some way: in case of the fulfillment of economic contractual jobs and in case of their introduction the payment of bonuses, at times in significant amounts, is in effect. But it is not this that is the main thing. It seems to me that the main thing is the evaluation of the community, the evaluation of colleagues.

I do not know other levers which would force the scientist to bring his developments into practice.

Now about the criteria of evaluation. Criteria exist, and, in my opinion, clear ones. This is the derived economic impact. If 50,000 rubles were spend on a development, while a national economic impact of 250,000 rubles was derived, it can be said that this is normal or even good. Here it is also necessary to take into account, of course, the social significance of the introduced innovation. One should also see how advanced it is. Therefore, the evaluation, so to speak, should also be qualitative. This is the level of the achieved result--the technical and economic result.

[Question] Moreover, the level should be the world level. Is that not so?

N.A. Borisevich: Yes, of course. Any new development should conform to both the domestic and the world levels.

[Question] The impression is being formed that mainly the moral interest of the scientist, and precisely it, based on what has been said, is decisive today, does not fully mobilize him for the introduction of his developments in production and for the achievement of this very "world" level. Does there not exist the need to better stimulate materially the labor of scientists?

G.N. Artyushevskiy: In recent times much has been done for this. For example, the amounts of the one-time prizes of the USSR Council of Ministers and the Belorussian SSR Council of Ministers, the corresponding ministries and departments for the end results of the introduction of developments are quite significant: from 3,000 to 40,000 rubles. Moreover, as is stipulated, not only scientists, but also production workers will be paid bonuses. But there is also the prize of the USSR Council of Ministers in science and technology and of the Belorussian SSR Council of Ministers in construction. It seems to me that there are sufficient material factors of the acceleration of scientific and technical progress. It is now a matter of using them wisely and efficiently.

S.G. Galuza: And then it is probably necessary to bear in mind that the stimulation of scientists for the increase of the efficiency of developments does not reduce only to the activation of the payment of bonuses. It is probably also necessary to talk about the improvement of the remuneration of labor as a whole. Including the basic wage. As of this year the Academy of Sciences is changing over to the new system of the remuneration of the labor of scientists. Up to now the remuneration of the labor of a scientific associate depended mainly on two circumstances--the academic degree and the length of service. Here the real scientific potential of the scientist, his return to production, and the efficiency of his developments were not always taken into account. The new system makes it possible to differentiate the remuneration better subject to the real effectiveness of the work of the scientist. For example, it is now possible to increase the supplementary payments to the basic salary by up to 50 percent. A wider "spread" of salaries is envisaged. All this will enable the management of institutes to give incentives to those people, who deserve this, and to reduce the stimulation of those who do not work wholeheartedly.

[Question] Thus, in the sphere of science the conditions are being created for all-round interest in the end results of scientific and technical progress. Well, and what about industrial enterprises--are they interested in this?

S.A. Astapchik: They far from always are. Why? Because owing to the intensity of the plans and owing to the overloading of their technological base they operate according to the principle of least risk. That is, they want to obtain specifically--a technology, a machine tool, moreover, a development that is without fail immediately advanced and adapted to this specific works. That is, a practically ready-made one, which, I repeat,

requires less risk and fewer material and financial expenditures. But, let us be realists, science cannot always do this. Why? Because, as was already said, its production base is weak. As a result the same enterprises do not want to "loosen their purse strings" in advance in order to take part in the bringing of one development or another up to the requirement of the given works.

Problems and Solutions

G.N. Artyushevskiy: It seems to me that in our discussion we have all the same devoted too little attention to the most important question--the planning of scientific and technical progress. In the national economy the plan is the main tool of the introduction of the achievements of science and technology in production. I do not entirely agree, therefore, with the statement of the director of the Institute of Problems of the Reliability and Durability of Machines, when he asserts that the role of the State Planning Committee reduces only to the gathering of orders and their submitting to superior organs, while the institute has to try to persuade some enterprise so that it would introduce this development there. I believe that it is a matter not of this. The main thing is to evaluate properly a good, completed development. To evaluate its importance and significance, and then to include it in the national economic plan. While the plan, as is known, is law.

True, it can be said that the plans on new equipment are not being completely fulfilled. For example, during the 11th Five-Year Plan, according to the data of the USSR Central Statistical Administration and our republic, the fulfillment of the plans on new equipment came to only 92-97 percent. And this was a great shortcoming. Now a practicable economic lever has been found so that new equipment, which has been included in the plan, would be introduced. These are the bonuses for the introduction of new equipment, which the managers of enterprises and all the people, who take part in some planned introduction or another, receive. Penalty measures are also envisaged: if an enterprise did not fulfill the plan on new equipment, even on the condition of the fulfillment of all the other indicators its management is deprived of 30 percent of the bonus. This provision has already been in effect for a year. I recently asked the State Committee for Labor and Social Problems to provide information on whether this norm "works." It turns out that it "works" and works quite broadly. And I believe that not by chance in recent times has the degree of fulfillment of the plans on scientific and technical progress at enterprises been increasing.

Of course, we cannot ignore the problems of the material and economic interest of production itself and the enterprise itself in the introduction of the achievements of science and technology in production.

[Question] What in this sense can economic science suggest and is it suggesting?

S.G. Galuza: Comrade Artyushevskiy correctly stated that it is necessary to solve the basic problems of the implementation of innovations through the plan. But this alone is not enough. It is necessary to supplement the force of the plan with the effect of economic levers. It is necessary to say that

at present not everything is well here. It is no secret that today an enterprise can also achieve success by means of extensive factors. For example, by means of the increase of the number of workers and the commitment of new capital investments to the turnover, by means of changes in the assortment in favor of products, which are profitable for itself and, perhaps, are not always profitable for the buyer. And perhaps also simply by the unfounded increase of prices. Such a thing also frequently occurs in our practice. And given all this the enterprise can have a good evaluation of its activity: it can fulfill the plan on the production volume and even receive a good bonus.

We need to adjust the economic mechanism in such a way that enterprises would be economically interested in the increase of efficiency, moreover, precisely on the basis of scientific and technical progress. Not at any cost, but namely in the direction of intensification, by means of the quickest use of scientific novelties, technical innovations, and so on. It is in this sense that economic science has a large number of suggestions.

In particular, it is recommended to develop some anti-expenditure mechanism. It is necessary to organize the system of the planning, financing, and stimulation of production in such a way that the excessive consumption of materials, resources, and energy would immediately affect the remuneration of labor. This is the so-called balance method of the remuneration of labor. It has already been adequately developed by our economic science, and practice should adopt it. It is necessary to augment such a system of stimulation with a large number of steps, which make the production of new equipment profitable for the enterprise.

Unfortunately, it is not always that way. It is no secret that the output of a new product and the development of new equipment involve additional costs which do not exist in case of the output of a product that has been assimilated by series production. And if some steps, which alleviate the burden of this new equipment for the enterprise, are not taken, the new equipment will always been less profitable than already assimilated equipment. And no matter how we want, no matter what we say in favor of new equipment, the producer enterprise will objectively be its opponent, because it worsens its indicators. Here it is necessary to use more consistently such a financial lever as the fund for the assimilation of new equipment and the unified fund for the development of science and technology, which, although it is being used in our country, it is being used inadequately and not in all sectors. Here not all the additional costs are offset, and the enterprise, which risks going into the plan on new equipment, often loses in the level of the fulfillment of its indicators and, hence, in the level of stimulation of its workers.

It is necessary to interest the enterprise in the output of not simply a new product, but a most efficient product, a product of the highest quality, which would meet the highest requirements, for example, would be competitive on the foreign market. It is here that prices are called upon to play a very important role. In recent decrees of the party and government precisely steps on the stimulation of high-quality products through prices are also envisaged. Price markups for quality in the amount of 30 percent are envisaged. This is

a very substantial step. And the most important thing is that a certain portion of these markups goes directly to the incentive fund. And on the contrary, penalties, which immediately affect automatically the material incentive fund, are being imposed on obsolete products. I repeat, this is a very important step.

The problems of the introduction of scientific and technical progress, which were named in the discussion, do not exhaust the entirely of today's interrelations of academic science and production. Nevertheless, they give a quite clear idea of the nature of these relations and of the difficulties which lie in the path from development of introduction.

Individual stages of this path have already been successfully covered. The round-table participants told about the established lasting contacts of the academy with individual enterprises, sectors, and departments. To a significant extent the great efficiency of the introduction of basic developments of science in production was achieved owing namely to these contacts. The goal program method of the planning and management of scientific and technical progress, which has become an important component of the socioeconomic development of the republic and the country, has assumed a broad scope. If in other directions and sections of introduction matters were if only the same, it seems that scientific and technical progress at the works would be accelerated by many fold.

At the same time it is impossible not to agree that the the main part of the problem has still far from been solved. First, a system of the large-scale introduction of academic developments has not been developed. As before the questions of the interaction of sectorial and academic science remain problematic. True, the most important economic and organizational prerequisites for this have already been established or are being established. Much is being done for the change of the thinking of people and for the improvement already in the immediate future of their moral and material stimulation. In short, possibilities to improve the work exist. Now the task is to fulfill consistently and steadfastly what has been planned.

Is this not the main result of our discussion today?

7807
CSO: 1814/3

GOSPLAN CONFERENCE DISCUSSES S&T PLANNING

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 9, Sep 86 pp 66-78, 79-85

[Article by G. Ivanov and A. Simonyan under the rubric "Problems of Scientific and Technical Progress": "Planning Scientific and Technical Progress (Materials of a Conference in USSR Gosplan)"; capitalized passages published in boldface]

[Text] In June 1986 a production conference of staff members of USSR Gosplan and the scientific research institutes attached of USSR Gosplan and responsible officials of the Moscow City Committee of the State Institutions Workers Union, at which the tasks of the further improvement of the planning of scientific and technical progress in the light of the decisions of the 27th CPSU Congress were discussed, was held in USSR Gosplan.

First Deputy Chairman of USSR Gosplan Corresponding Member of the USSR Academy of Sciences S.A. Sitaryan opened the conference.

The report "Improving the Planning of Scientific and Technical Progress and the Development of Science in the Light of the Decisions of the 27th CPSU Congress" was delivered by V.V. Simakov, a member of the Collegium of USSR Gosplan and chief of the Science and Technology Consolidated Department.

In order to carry out the task of accelerating scientific and technical progress, the five-year plan and the corresponding documents make provision for the concentration of resources that determine the key, strategic, long-range directions of economic development and for the creation of favorable conditions for the massive utilization of technical innovations, for a speedup in research and development of fundamentally new types of machinery and technologies.

A unique feature of the 12th Five-Year Plan is that it integrates scientific and technical progress indicators in all its principal sections and raises their influence on final national economic results while reducing the overall number of assigned indicators. Unlike past practice, the science and technology plan was drafted before other sections of the plan with the active participation of heads of ministries and department chiefs responsible for the integrated planning of branches of the national economy and deputy chairmen of USSR Gosplan and the GKNT [State Committee for Science and Technology].

The further improvement of the planning of scientific and technical progress, which requires the restructuring of all our planning activity, was a problem that became particularly urgent in the process of drafting the plan. The general line in this regard was articulated by the Basic Directions of Economic and Social Development of the USSR in 1986-1990 and the Period up to the Year 2000: "To effect the transition to the comprehensive planning of scientific and technical progress, to carry out the necessary measures so that the plan's targets would be based on advances of scientific and technical progress and would ensure the development of every branch based on the broad application of new machinery and technology."[1]

The comprehensive planning of NTP [scientific and technical progress] is a problem with multiple aspects. The solution of the problem must include all stages of NTP, basic research, development [razrabotka], the mass production of new generations of machinery in quantities sufficient to satisfy the country's internal and export needs, the exploitation of machinery, the timely removal of machinery from production to make way for the next generation; the harmonious interaction of all links both vertically (at the various levels of planning and management) and horizontally (developers, producers, users of new machinery) in order to eliminate departmental barriers and uncoordinated action; consideration of all planning horizons (long-range, five-year, one-year plans); and the unity of branch, territorial, and programmed planning of NTP.

The existing system for the comprehensive planning of scientific and technical progress is called upon to secure the formation of all plans on the basis of priority directions of NTP and their interconnection with the economic mechanism in order to attain high final national economic results.

Comprehensive planning of NTP must combine the centralized establishment of plan indicators and targets of the necessary level of final national economic results with the expanded independence of complexes, branches and enterprises in the selection and utilization of specific measures (scientific, technical, organizational, economic) that ensure the requisite level of effectiveness in production. The centralized orientation of the system of comprehensive generalized indicators of NTP and the development of science and technology toward the final results makes possible the planned implementation of a unified scientific and technical policy based on the coordinated interaction of all planning and management links and levels. The structure of such a system may consist of the following sections and indicators:

PRODUCT QUALITY (the share of machinery delivered for export; the share of output in the highest quality category; the rate of product modernization);

EFFECTIVENESS AND STRUCTURE OF UTILIZATION OF RESOURCES: labor resources (growth of labor productivity; relative release of manpower as a result of the introduction of advances of NTP; absolute release of manual laborers); material resources (reduction of materials-, energy-output ratio); capital investments (share of capital investments in the development of priority branches of the national economy and industry, in technical retooling and reconstruction);

ECONOMIC EFFECTIVENESS (expenditures per ruble of output; the saving resulting from the lowering of production cost due to the introduction of advances of NTP; the share of profit due to the saving resulting from the lowering of production cost);

PRIORITY DIRECTIONS OF SCIENCE (the development of systems of new generations of technologies, machinery and materials).

THE SYSTEM OF COMPREHENSIVE GENERALIZED INDICATORS OF NTP MUST HAVE THREE LEVELS OF PLANNING: THE NATIONAL ECONOMY AS A WHOLE, COMPLEX OF SECTORS OF THE NATIONAL ECONOMY, AND INDIVIDUAL SECTORS--MINISTRIES AND DEPARTMENTS. This makes it possible, while preserving the general structure of generalized indicators of NTP at all levels, to coordinate them reciprocally through specific targets for the creation and satisfaction of the requirement for new generations of products that are specific for every complex, ministry and department.

The consolidated section "Scientific and Technical Progress" has already been established in the above-cited structure of comprehensive generalized indicators of NTP at the national economic level. At the level of complexes of sectors of the national economy, generalized indicators are substantiated on the basis of targets for developing and satisfying the need for new generations of products; at the level of ministries and departments--additionally, by measures in the comprehensive program for the reconstruction and technical retooling of the sector.

The Comprehensive Program of Scientific and Technical Progress in the USSR and the Master Plan of Location of the Productive Forces of the USSR must serve as the preplanning basis for determining the planned levels of the generalized indicators of NTP and the selection of the corresponding targets ensuring the attainment of that level and their balance for all sections of the plan.

The Comprehensive Program of Scientific and Technical Progress in the USSR should forecast generalized indicators of the technical level of new generations of technologies and machinery in the extended future.

Thus, in the process of drafting the five-year plan, it is necessary to have three levels of generalized indicators: indicators actually in existence at a given time; planned indicators that are based on new generations of machinery that are put into series production; and forecast indicators--indicators that are oriented toward the development of new generations of machinery (programs).

The structuring of comprehensive generalized indicators of NTP in this way will orient all targets toward final national economic results, will raise the level of planning of interconnected branches (complexes), will permit the centralized combination of plan targets for accelerating NTP with the independence, initiative, and responsibility of associations and enterprises for the selection of the most effective measures pertaining to NTP and the development of science.

A special role in the planning of measures relating to scientific and technical progress is played by the criteria used in their selection. The most effective attainments of NTP and plan targets based on them must be evaluated based on the quality of systems of new generations of technology, machinery and materials corresponding to the forecast world level and the effectiveness of the utilization of labor, material, financial, and production resources making it possible to increase the productivity of social many fold in the process of satisfying the need for new machinery.

The work of the Planning Survey Works Department in evaluating plan targets for the reconstruction of concentration combines by analyzing the effectiveness of existing equipment (variant 0) used in the design of a concentration mill in the Almalyk GMK and in the utilization of equipment with large unit capacity (variant 1) and generation equipment (variant 2).

Indicator	Variant 0	Variant 1	Variant 2
Quantity of equipment (units)	1,380	450	220
Site area (m^2)	80,000	45,000	18,600
Construction volume (m^3)	2,100,000	1,440,000	460,000
Estimated cost (millions of rubles)	360	300	260
Annual labor productivity per worker (thousands of tons)	20	35-40	85-100

Comparison of the variants shows that only a design involving the use of new generation equipment and technology will produce a cardinal technical and economic effect.

Work performed by the Machine Building and Interbranch Production Consolidated Department can serve as another example of the formulation of plan targets relating to the development of new generations of machinery. As a result, in the process of the formulation of the quota for the 12th Five-Year Plan, the production of rotary and rotary-conveyer lines increased more than fourfold since they specifically make it possible to reduce production area to one-third to one-half, to increase labor productivity by four- to tenfold, and to release more than 100,000 workers.

The comprehensive planning of NTP strengthens the role of departments responsible for the comprehensive planning of branches of the national economy and sectorial departments. Therefore, the professional qualifications and responsibility of sectorial departments for the development of criteria and selection of targets incorporated in the sections "Development of Science and Technology" and "Production of the Most Important Types of Products," that provide for the satisfaction of the country's internal and export needs for new generations of machinery and technology are the basis of the plan.

In keeping with this task, the Consolidated Five- and One-Year Planning Department together with the Science and Technology Consolidated Department developed a new structure for the "Development of Science and Technology" section. The structure makes it possible to concentrate resources on the most important baseline systems in the new generations of technology, machinery and materials in order to raise final national economic results.

Work on the 12th Five-Year Plan together with departments responsible for the comprehensive planning of sectors of the national economy and sectorial departments revealed new potential of the system for comprehensive planning of NTP and reserves for further increasing the effectiveness of production. Use of the latter must be coordinated with the improvement of systems for the comprehensive planning of NTP and the entire structure of the national economic plan. Considering the multiple aspects of the comprehensive planning of NTP and the complexity of the interrelationship of all sections of the plan, it can be said that the success of this work will depend on the coordinated methodological activity of all USSR Gosplan departments.

Comprehensive planning of NTP can be effective only if it includes sections associated with the planning of: the mass production of new products; labor saving; materials and energy and their balances based on NTP; reconstruction and the technical retooling of production; the investment structure of capital investments; the concentration of financial resources in the key directions of NTP and the securing of economic effectiveness; and norms.

The improvement of management and the economic mechanism is of fundamental significance in the acceleration of NTP.

Under present conditions, at a time when the acceleration of scientific and technical progress is the decisive factor in economic intensification, the activity of science-production associations (NPO's) and production associations (PO's) acquires major significance in the implementation of uniform scientific and technical policy and in the fulfillment of five-year plan targets. As the experience of a number of NPO's and PO's with an optimally developed structure and modern conditions of management shows, the process of developing highly effective technologies and systems of equipment is reduced several-fold owing to its continuousness and the comprehensiveness of the work under uniform integrated plan-schedules.

The management of associations together with the chief designers of development efforts [razrabotki] have the possibility of concentrating resources in the key directions of the work and of ensuring responsibility for the prompt satisfaction of the national economy's need for technologies and systems of machines on a par with or better than the world level.

However, cardinal changes in the effectiveness of the work of NPO's, PO's and scientific research organizations [NII's] are not taking place.

NPO's, PO's and NII's are presently having difficulties with their existing experimental-pilot production facilities, which makes it difficult for them to carry out their basic tasks. Production subdivisions are planned and financed by various higher-level organizations from various sources of financing. The

performance of scientific subdivisions is determined according to the fulfillment of the plan for scientific research work; planning and the evaluation of the results of production subdivisions are determined according to the results of industrial activity. There is no concentration of resources and stimulation of collectives of associations for the accelerated development of new, highly effective machinery and the capacities of pilot and series enterprises are frequently used to produce obsolete products.

In NPO's there are several systems of pay and material incentives for personnel of plants and institutes and the leaders of associations, whose interests are not united. Owing to the impossibility of redistributing resources for individual types of activity, discrepancies arise in the remuneration of homogeneous labor in different structural subdivisions.

The Improvement of Planning and Economic Stimulation Department together with other departments of USSR Gosplan has prepared proposals for the restructuring the planning mechanism for the management of science-production associations:

--to establish profit in the cost (price) of the product as the single source for forming the association's resources for scientific and technical and industrial development and for the material stimulation of the collective; to take the procedure for forming and distributing profit in accordance with the updated variant of the economic mechanism of the Sumy Machine Building NPO imeni M.V. Frunze as the basis;

--to establish prices on the product of science and technology, including it in the overall volume of commodity output. To form prices on the basis of normative costs and normative profitability differentiated depending on the scientific and technical level of the product (higher than, equal to or lower than the world level);

--to perform research and development work [NIOKR] primarily on the basis of contracts with enterprises, organizations and ministries, using borrowed resources (USSR Gosbank and Stroybank loans, resources of ministries), excluding nonreturnable financing from the unified fund for the development of science and technology [YeFRNT];

--to form a unified balance and a single category of personnel--science-production personnel--in associations;

--to establish a procedure for backing up experimental-pilot production capacities in accordance with the thematic plan of scientific subdivisions.

The essence of the modern method of management consists not so much in the optimal technical decision-making process as in the ability to stimulate workers, to foster a creative working atmosphere in work collectives, and to introduce new forms of labor organization.

M.A. Klimov (senior expert of the Long-Term Economic and Social Development Department of USSR Gosplan) expressed certain ideas and proposals regarding the system of comprehensive planning. In his opinion, the content of the "system of comprehensive planning" should be defined more precisely. What are

its structure, functions, objectives, and technology? What should every Gosplan department do under this system?

The time has come to prepare a general methodological document of "Basic Principles of the System of Comprehensive Planning and the Procedure Underlying Its Formation." It should reflect a unified understanding of the terms indicated above and organizational questions with a certain breakdown for various areas of national economic planning. This is especially important at a time when work is beginning on the next five-year plan and plans for the extended future.

It is essential that new guidelines [metodicheskiye ukazaniya] be preceded by serious, comprehensive, systems analysis of the state of planning and management of the sphere of scientific and technical progress and the causes of its slow development. As is known, the planning of NTP is not an isolated process. In the total organism of the national economy, it touches other spheres of activity and sections of the national economic plan (production, capital construction, etc.). It is very important that analysis and the conclusions and proposals stemming from it have concerned the entire chain of interaction of the NTP sphere with contiguous and allied spheres of the economy. Unfortunately, today we lack thorough analysis of the system of planning and management of technical progress. While elements of this were reflected in V.V. Simakov's report, its focus was on the substantive aspect of technical progress rather than on organizational and methodological questions that are of no less interest.

M.A. Klimov emphasized the keynote speaker's idea that there are many aspects to the concept of the NTP system. Vertical levels of economic management from the national economic to the enterprise should also be identified. It is very important not to lose sight of the territorial aspects of NTP, otherwise such important questions as the creation of machinery for various natural and climatic zones or questions of regional cooperation in the NTP sphere and the management of this process will not be addressed. There is also a horizontal aspect of the system, i.e., throughout the entire chain of development of technical innovations (from the idea to production).

The time aspect, without which the system cannot be effective, is addressed to a slightly lesser degree. The development of new machinery and technology is reflected in one way or another in five- and one-year plans, but not enough attention is devoted to the long term planning of NTP. At the same time, it is known that the life cycle of a technical idea (from the creation to the introduction and mass saturation of production with new machines or technologies and their removal from production) usually exceeds a five-year period. It would be useful to analyze what has been done in the long term planning of NTP in the process of preparing materials for the congress and the conclusions and tasks that arise therefrom.

The summary volume "Basic Indicators of Economic Development Up to the Year 2000" contains the section "Scientific and Technical Progress," which consists of three subdivisions ("Generalizing Indicators of NTP," "Indicators of the Technical Level of Machine Building," and "Indicators of the Reduction of Norms Governing the Expenditure of Basic Types of Raw Materials and Supplies

on Production"). The sections are small. The first two contain approximately 20 indicators; the third, slightly less. Analysis shows deficiencies in the set of indicators. Thus the subsection "Indicators of the Technical Level of Machine Building" discusses production automation but does not even mention SAPR's, ASU's, etc. The sectorial sections on the extended future do not sufficiently reflect promising technical directions that will form the technological and economic level of Soviet production by the end of the current century. The planned industrial product mix up to the year 2000 is very traditional. In it there is virtually not a single new item from those that have already appeared in the 12th Five-Year Plan. Thus, machine building section of the five-year plan already includes such modern items as laser units, rigs for the electron-beam and plasma processing of materials, etc., but they are absent from materials on the extended future.

What will the technical level of production be in the year 2000? Toward which new technologies and machines should sectors be oriented. What must be done to this end under the 12th Five-Year Plan? We do not have the answers to these questions in our long term projections. When we commence our long term planning in the near future, we should seriously weigh its substantiation, technology and system of indicators. The main idea and direction of this work should consist in the strengthening of specificity of technical policy and NTP projections and tasks for the extended future and in conveying an address character to them.

N.I. Fomichev (candidate of economic sciences, chief of a subdepartment of the Department of Consolidated Five-Year and One-Year Planning of USSR Gosplan) emphasized that the rates of scientific and technical progress depend first and foremost on the content and scale of development of new implements of labor, materials and technologies. In recent years, substantial contradictions have surfaced in the state and reproduction of means of labor--the disparity between the technical level and the economic results of production. Even though the technical level rose, a number of economic indicators and proportions of reproduction deteriorated: between 1970 and 1984, the gap between the growth rates of labor productivity and capital per worker increased from 8 to 62 points. The output-capital ratio declined (by 14 percent between 1971 and 1985). Therefore, the problem of eliminating these negative phenomena has been placed on the agenda.

THE FIVE-YEAR PLAN CALLS FOR INCREASING THE RETIREMENT OF OBSOLETE FIXED CAPITAL 2.2-FOLD; FOR RAISING THE SHARE OF NEWLY ACTIVATED FIXED CAPITAL TO 95-96 PERCENT OF THE OVERALL VOLUME OF PRODUCTIVE CAPITAL INVESTMENTS; FOR DRAWING PART OF ABOVE-NORM CONSTRUCTION IN PROGRESS AT THE END OF THE 11TH FIVE-YEAR PLAN INTO NATIONAL ECONOMIC CIRCULATION; FOR ACCELERATING THE MODERNIZATION OF THE FIXED CAPITAL OF MACHINE BUILDING BY 10-12 PERCENT; FOR ALMOST HALVING THE RATE OF DECLINE OF THE OUTPUT-CAPITAL RATIO (IN COMPARABLE 1973 PRICES) IN THE NATIONAL ECONOMY AND IN INDUSTRY AND THE COMPLETE ELIMINATION OF ITS DECLINE IN MACHINE BUILDING AND IN A NUMBER OF BRANCHES OF INDUSTRY GROUP 'B.'

The plan envisages substantial structural changes in capital investments for the purpose of realizing these tasks in order to accelerate the modernization and improve the utilization of fixed capital. THE GROWTH RATE OF PRODUCTIVE

CAPITAL INVESTMENT WILL BE RAISED 1.2-FOLD; INVESTMENTS IN TECHNICAL RETOOLING AND RECONSTRUCTION OF EXISTING ENTERPRISES--BY 70 PERCENT; AND INVESTMENTS BY ENTERPRISES IN CAPITAL CONSTRUCTION AND THE RETOOLING OF PRODUCTION--2.3-FOLD. UNDER THE 12TH FIVE-YEAR PLAN, THERE WILL BE DRAMATIC ACCELERATION OF THE DEVELOPMENT OF MACHINE BUILDING: THERE WILL BE A 1.8-FOLD INCREASE IN THE VOLUME OF CAPITAL INVESTMENT (OVER 30 BILLION RUBLES ARE ALLOCATED FOR TECHNICAL RETOOLING AND RECONSTRUCTION); THERE WILL BE MORE ACTIVE REPLACEMENT OF EXISTING CAPITAL AND MODERNIZATION OF ALL FIXED CAPITAL IN MACHINE BUILDING, especially its active part. Thus, while under the 11th Five-Year Plan, the latter was modernized by 2.2 percent, at the end of the 12th--almost 10 percent. This will become possible as a result of the restructuring and improvement of the utilization of potential envisaged in the five-year plan. One particular must be emphasized. The more effective replacement of fixed capital is planned in order to retire 240 billion rubles' worth of obsolete fixed capital during the five-year plan period. Hence the exceptional importance of the demand for the MANY-FOLD INCREASE IN THE PRODUCTIVITY OF NEW EQUIPMENT. Only on this basis is it possible to secure simple and expanded reproduction and the improvement of the economic indicators of the utilization of fixed capital.

A NUMBER OF NEW APPROACHES WERE USED TO SUBSTANTIATE THE RATE OF MODERNIZATION OF FIXED CAPITAL AND THE STRUCTURE OF CAPITAL INVESTMENTS IN THE DEVELOPMENT OF THE NATIONAL ECONOMY AND ITS SECTORS IN THE PREPARATION OF THE BASIC DIRECTIONS AND THE 12TH FIVE-YEAR PLAN. Prior to the commencement of their elaboration with the use of materials of the USSR Central Statistical Administration, the volume and age structure of fixed capital were analyzed and sectorial coefficients and the volume of replacement (retirement) of worn-out and obsolete equipment in sectors of industry was determined. Reciprocally coordinated economic indicators have been calculated on the basis of balances of production capacities and fixed capital. In view of the accelerated modernization of the latter, capital investments were restructured to increase the rate of technical retooling and reconstruction of existing production and to increase the return on investments of enterprises and organizations in capital construction. USSR Gosplan departments jointly examined the proposals of ministries, departments and union republics on the utilization of production capacities and limits of capital investments. The potential of the created production potential was taken into account more completely and the scale and rate of technical retooling were determined. Special attention was focused on the dynamics of the economic indicators of labor productivity, production cost, per unit capital investments; on the growth of output; on raising the output-capital ratio; and on the modernization of fixed capital. POSITIVE EXPERIENCE OF THE COMPREHENSIVE EXAMINATION OF PROPOSALS ON DRAFT PLANS OF CAPITAL INVESTMENTS AND THE MODERNIZATION OF FIXED CAPITAL SHOULD ALSO BE USED IN DRAFTING ONE-YEAR PLANS IN 1987-1990.

A 1986 INVENTORY OF MACHINERY AND EQUIPMENT IN INDUSTRY EVALUATED THEIR TECHNICAL STATE AND THE PROGRESSIVENESS OF TECHNOLOGICAL PROCESSES. New amortization norms will be introduced on 1 January 1988. Norms governing the repair of fixed capital are being developed. Improvements are slated in the procedure for accounting and certifying jobs in sectors of the national economy. The inventory of fixed capital takes into account new qualitative

demands compared with previous equipment censuses. It must first of all determine the technical level of available fixed capital and realistically evaluate the progressiveness of equipment and production processes in industry. This will make it possible to analyze the level of scientific and technical progress in means of labor and to take it into account in the substantiation of sectorial plans and technical reconstruction programs.

THE ACCELERATION OF SCIENTIFIC AND TECHNICAL PROGRESS DEPENDS TO A DECISIVE DEGREE ON CAPITAL CONSTRUCTION. TWO FACTORS ARE ESPECIALLY IMPORTANT HERE: THE TIMELINESS OF THE ACTIVATION OF THE ENTIRE AGGREGATE OF PLANNED FIXED CAPITAL AND PRODUCTION CAPACITIES AND THEIR TECHNICAL AND ECONOMIC LEVEL.

It must be acknowledged that the tendency to retain the "gross"--the overall volume of construction and installation work--is still observed in capital construction. This can reduce the role of construction's commodity output (the turning over [sdacha] of finished projects and capacities to customers) as a five-year plan indicator. The abolition of the planning of profit on the basis of the turning over of construction's commodity output and the return in one form or another to the practice of calculating the incentive fund in construction on the basis of the gross volume cannot be considered substantiated. The leading construction ministries show reluctance to settle accounts with customers for the completed project as a whole on a turnkey basis. Such tendencies are extremely undesirable for the national economy and must not be permitted. THE ECONOMIC MECHANISM IN CAPITAL CONSTRUCTION MUST BE ORIENTED TOWARD THE SCHEDULED ACTIVATION OF FIXED CAPITAL AND PRODUCTION CAPACITIES. The organization of the conversion of construction organizations to the new conditions of management acquires fundamental importance. It is necessary to convert large economic systems (USSR Ministry of Construction of Heavy Industry Enterprises, USSR Ministry of Industrial Construction) to these conditions simultaneously and not only individual organizations since incomplete restructuring will lead to unjustified delays in the experiments).

Yu.N. Ivanov (doctor of physical mathematical sciences; chief of laboratories of the All-Union Scientific Research Institute of Systems Research of USSR Gosplan and USSR Academy of Sciences) urged that STATE PLANS FOR NEW TECHNOLOGY INCLUDE TARGETS FOR CONCRETE SCIENTIFIC AND TECHNICAL MEASURES AS WELL AS TARGETS CONTAINING GENERAL INDICATORS. In the capacity of general indicators, it is better to have not ABSOLUTE but PER UNIT indicators: coefficients of direct expenditures, labor-intensiveness and capital-intensiveness reflecting the influence of scientific and technical progress. Per unit indicators must be related to the level of complexes or ministries (sectors): outlays of output of the Ministry of Power and Electrification per unit of output of the Ministry of Ferrous Metallurgy; outlays of output of the Ministry of the Chemical Industry per unit of output of the Ministry of Nonferrous Metallurgy; labor-intensiveness of output of Gosagroprom, etc. CONCRETE SCIENTIFIC AND TECHNICAL MEASURES ENVISAGE CENTRALLY CONTROLLED MEASURES and their number must be relatively small. Centralized management of the introduction of the most important technical advances will guarantee their optimal utilization and a high economic effect. Other innovations are in the sphere of sectorial management. Their introduction will be monitored through per unit [udelnyye] indicators. Thus, THE MANAGEMENT OF SCIENTIFIC AND TECHNICAL PROGRESS AS A CONCEPT TAKES THE FORM OF MANAGEMENT OF SPECIFIC

SCIENTIFIC AND TECHNICAL MEASURES SUPPLEMENTED BY THE MANAGEMENT OF PER UNIT BRANCH INDICATORS.

G.T. Vlasenkov (chief of a subdepartment of the Improvement of Planning Department of USSR Gosplan) noted that work on the improvement of the economic mechanism is proceeding at a slow pace. The urgency of some problems, e. g., the profitability of new machinery, has not diminished. The profitability of new machinery is low compared with machinery that has been in production for a long time, i.e., machinery that is obsolete and has a profitability of 30-40 percent or more. But it would be a grave error to bring the profitability of new machinery to the level of obsolete machinery. This is not the way to achieve positive results. In order to eliminate this shortcoming, the prices on old products must be systematically lowered. Moreover, at the time the wholesale price is assigned to new machinery, a price reduction scale should be established on the basis of the machinery's estimated service life. For example, if there are no improvements in the technical and economic indicators of a machine in the course of 2 years, its price should be reduced by 20 percent, in the course of 3 years--by 30 percent, etc., so that every enterprise would know that it cannot secure the development of its production without modernizing its products. But this problem cannot be solved by prices alone.

No less important is the relationship between the wage system and the quality of the product. The introduction of the share of output in the highest quality category as an indicator has produced rather good results in this regard. But its significance has appreciably declined of late. It would seem feasible to link the level of pay of engineering and technical personnel specifically to such an all-round indicator of scientific and technical progress.

The planning of the economic results of the introduction of new technology also requires improvement. The plan for new technology should be evaluated not according to the number of measures implemented but according to the end results. We must learn to plan these economic results in both a scientific and methodological sense and develop a system of norms governing the effectiveness of introduction of new machinery at the sectorial level as well as in various directions of NTP.

Yu.P. Lapshin (doctor of economic sciences, deputy chief of the Computer Technology Department of USSR Gosplan) recalled the words of M.S. Gorbachev to the effect that computing and calculating equipment [vychislitelnaia tekhnika] and the entire sector of information science is the catalyst of scientific and technical progress. This approach was confirmed in the materials of the 27th CPSU Congress and the June Plenum of the CPSU Central Committee and at the recent session of the USSR Supreme Soviet. The large part that is played by this technology is objectively conditioned by all worldwide experience and by our own experience. The qualitatively new form of automation of the entire "science-design-production" cycle is the principal feature in its broad application in the present stage of its development. All types of computing and calculating equipment have become the foundation of the qualitative stage of automation. The 12th Five-Year Plan will be herald a sharp turn in its production. The capital investment allocation for this is three times larger

than in the past. The production of computing and calculating equipment will grow 2.5-fold. The experience presently amassed in the utilization of computing and calculating equipment in the sectors and the scale of planning of work pertaining to the automation of management require the serious, closer coordination of specific indicators of the development of the national economy with the planned volume of work.

In the preparation of the new five-year plan, an effort was made to increase the effectiveness of the application of computing and calculating equipment. At the same time, it will be necessary to concretize the goals of development of this direction throughout the entire national economy and in every sector.

Under the 12th Five-Year Plan alone, the national economy will receive a considerable quantity of various technical means that are commonly considered to be a so-called science-intensive resource. The fact that they will be delivered to sectors must be taken into account in the process of assigning labor productivity growth targets, cost reduction targets, etc. These possibilities must be utilized intelligently. Needs must be calculated on the basis of final indicators of the development of the national economy and individual sectors. In order to incorporate in plans indicators characterizing the effectiveness of computing and calculating equipment, A SYSTEM OF ECONOMIC NORMS SHOULD BE ELABORATED AND SUPPORTED ACCORDINGLY, and the influence of plans on the more effective utilization of a considerable arsenal of computing and calculating equipment should be intensified.

A.Yu. Makarova (candidate of economic sciences, senior expert of the Finance, Production Cost and Price Department of USSR Gosplan) believes that the effectiveness of production must be raised dramatically based on the acceleration of scientific and technical progress in order to implement the given program for the socioeconomic development of the national economy. The growth of profits as a result of the lowering of production cost [sebestoimost] due to the raising of the technical level of production will be the basic source of net income growth in sectors and in the national economy in general. However, in the process of drafting sectorial plans, not enough attention is paid to the calculation of the saving resulting from the lowering of production cost due to the introduction of new technology. Today as well, at a time when the five-year plan has been developed and approved, there is no basis for complacency. In industry, the planned relationship between the economic effect of scientific-technical measures and the growth of net output in the current five-year plan is even worse compared with the 11th Five-Year Plan. The time has come to have a guidepost in the form of normative effectiveness of expenditures on the introduction of new technology at every level of planning (from the enterprise to USSR Gosplan).

It would be more correct to calculate these norms on the basis of the norm of absolute effectiveness (of the increase in profit due to the lowering of production cost) of capital investments, to count all expenditures on raising the technical level of production and not within the limits of capital investments. The effect (lowering of production cost) must be planned not only for the technical retooling and reconstruction of existing enterprises, but also for the activation of new production facilities and the expansion of existing capacities, which is not presently the practice. What is more, no

targets for the effect of new technology are set for construction, transport and agriculture. This reduces the role and potential of technical progress in securing the growth of national income. In connection with the conversion of ministries and departments to the new conditions of management, there are proposals that ministries not be assigned targets based on the level of costs per ruble of commodity output and the total saving resulting from the lowering of production cost due to the higher technical level of production. We cannot agree with such a formulation of the question. Under the conditions of commodity-monetary relations, any reduction in the expenditures of SOCIAL labor on production or on the effectiveness of production is expressed in the lowering of the production cost of products. This is accompanied by the release of labor and material resources that can be used FOR EXPANDING OUTPUT WITHOUT ADDITIONAL PRODUCTION RESOURCES. This is what is meant by the acceleration of production on an intensive basis. The reduction of the costs of production is naturally reflected in higher profit. The latter, unfortunately, grows not only as a result of cost reduction but also due to the use of additional production resources or unsubstantiated price rises. Both one and the other are unacceptable. PRODUCTION COST TARGETS MUST THEREFORE BECOME THE CRITERIA OF THE EFFECTIVENESS OF PRODUCTION AND ITS ACCELERATION ON AN INTENSIVE BASIS.

D.A. Terentyev (chief specialist of the Labor Department of USSR Gosplan) noted that the lack of the appropriate guidelines frequently hindered the effort to plan measures relating to scientific and technical progress and the economic effectiveness of their introduction. It appears essential that the Scientific Research Economics Institute of USSR Gosplan together with the Institute of Economics of the USSR Academy of Sciences, the GKNT and ministries prepare guidelines as well as forms and indicators for the planning of scientific and technical progress since the old ones have long been obsolete.

USSR Gosplan is an economic agency and its task is to take more completely into account the total economic effect of the introduction of the complex of measures pertaining to scientific and technical progress.

The 27th Party Congress noted that two-thirds of the growth of social labor productivity and and the targets of that indicator in material production should be achieved as a result of scientific and technical progress. But in the sphere of material production today, only industry counts the economic effect of the introduction of scientific and technical measures. No similar count is made in agriculture, in transport, in construction, or in communications. But scientific and technical progress should be planned not only in material production but in the nonproductive sphere as well.

A.Kh. Salnikov (candidate of economic sciences, chief specialist of the Norms and Quotas Department of USSR Gosplan) stated that the CLOSE RELATIONSHIP BETWEEN THE RATIONAL AND ECONOMICAL UTILIZATION OF MATERIAL RESOURCES AND SCIENTIFIC AND TECHNICAL PROGRESS, which is responsible for roughly 70 percent of the total saving of resources in the national economy, NECESSITATES THE BROAD APPLICATION OF THE METHODS OF COMPREHENSIVE COORDINATION OF PLANS FOR THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY AND RESOURCE CONSERVATION WITH RESOURCE CONSERVATION PLANS IN MANAGEMENT. THE PROPER COORDINATION OF PLANS

FOR THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY WITH RESOURCE CONSERVATION PLANS HAS NOT BEEN ACHIEVED TO DATE. Physical indicators of the saving of material and energy resources in the principal directions of scientific and technical progress are still not reflected in plans for the development of science and technology. The existing situation with the formation of conservation indicators has also had a negative impact on the list of measures addressed to ministries and departments in the science and technology development section of the plan. As a rule, it takes into account a negligible share of the general saving of resources. THERE IS A NEED TO INTENSIFY THE SEARCH FOR WAYS AND TO ACCELERATE THE ELABORATION OF INDICATORS REFLECTING RESOURCE CONSERVATION MEASURES IN PLANS FOR THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY associated with scientific and technical progress. At the same time, THE LIST OF MEASURES REFLECTED IN PLANS FOR THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY MUST CONTAIN ALL RESOURCE-CONSERVING MEASURES DIFFERENTIATION FOR YEARS OF THE FIVE-YEAR PLAN AND FOR MINISTRIES AND DEPARTMENTS OF THE USSR. Since plans for the development of science and technology do not always reflect resource-conserving measures of an intersectorial nature, it is not possible to coordinate the plans of ministries and departments using progressive resource-conserving equipment with the plans of ministries producing this equipment and to take into account the real potential for conserving resources in these plans

For example, the considerable saving of electric power (3.7 billion kilowatt-hours) by the national economy as a result of the use of new cables (type APvV and POSKhV) produced by the Ministry of the Electrical Equipment Industry was not taken into account in conservation targets assigned to ministries in the program for the development of science and technology under the new five-year plan.

Another reason why such occurrences are possible is that we have not yet developed uniform scientifically and economically substantiated principles governing the approach to the formulation of the plan for the development of science and technology that permit the maximum implementation of resource-saving measures indicated in the decisions of directive agencies. It is essential to bring order to the system of indicators reflected in the plan in order to eliminate their unjustified duplication in different sections of the plan (including the "Development of Science and Technology" section).

THE RECTIFICATION AND FURTHER IMPROVEMENT OF INDICATORS THAT CHARACTERIZE THE EFFECTIVENESS OF THE UTILIZATION OF MATERIAL AND FUEL-ENERGY RESOURCES AND THAT ARE INCLUDED IN THE "SCIENCE AND TECHNOLOGY DEVELOPMENT" SECTION REQUIRE: the planning, not of individual measures of scientific and technical progress but of targets stemming from plan resource conservation indicators associated with improvements in design, technology and the organization of production; and the determination of indicators that characterize the effectiveness of the utilization of resources with due regard to the introduction of NTP measures and conditions that make it possible to implement these measures for each sector of the national economy and industry. In the interest of raising the role and responsibility of the GKNT for the introduction of the results of scientific development efforts and of bringing them to the stage of mass industrial utilization, it appears advisable to make the GKNT responsible for the elaboration of the state plan section for the development of new types of

products and technology and to leave only measures characterizing the EXPANDED APPLICATION OF TECHNOLOGICAL PROCESSES AND EQUIPMENT ASSIMILATED IN INDUSTRY in the section of the plan formulated by USSR Gosplan.

V.Kh. Valikhov (chief of a subdepartment of the Machine Building Consolidated Department of USSR Gosplan) noted that the planning of scientific and technical process is an integrated process that is on the one hand associated with the attainments of scientific and technical progress and on the other hand with quantitative plan indicators: with sections of industry (scale of production), construction, the development of the corresponding capacities, etc. The Machine Building Consolidated Department has amassed experience in working together with the Science and Technology Consolidated Department and sectorial machine building departments for the coordination of qualitative indicators of the technical level of output of the new technology plan with quantitative indicators of the industrial section of the plan. Such indicators of a general nature have been developed and the appropriate targets have been included in the five-year plan and in the plan for 1986. In the process of examining the draft of the five-year plan, general indicators were approved for the machine building complex, including the SHARE OF PRODUCTS IN THE BASIC MIX CORRESPONDING TO THE LEVEL OF WORLD TECHNOLOGY IN THE OVERALL PRODUCTION VOLUME. IN SERIES PRODUCTION IN 1990, IT WILL BE 80-95 PERCENT; IN THE DEVELOPMENT OF TECHNICAL DOCUMENTATION--100 PERCENT. THIS IS VERY IMPORTANT BECAUSE MACHINERY IN DEVELOPMENT EFFORTS FOR SUBSEQUENT SERIES PRODUCTION MUST SURPASS THE WORLD LEVEL.

General indicators in the area of the modernizability of products and certain others characterizing the degree of automation of equipment with the application of microprocessors are of substantial importance. The latter ensure the MANY-FOLD INCREASE IN LABOR PRODUCTIVITY AND THE SUBSTANTIAL SAVING OF MATERIALS, ENERGY AND LABOR RESOURCES.

M.G. Yesenkov (candidate of economic sciences, deputy chief of the Chemical Industry Department of USSR Gosplan) stated that the "Science and Technology Development" section of the 12th Five-Year Plan envisages a considerable rise of the technical level and growth rates of production in chemistry and petrochemistry, which corresponds to the objectives of the comprehensive target program for the chemicalization of the national economy for the period up to the year 2000. Primary attention is concentrated on the creation of new products for the more complete satisfaction of the needs of various sectors of the national economy and the introduction of highly productive technologies while reducing expenditures of materials and energy to the minimum. The production of structural plastics with progressive engineering and technical properties will grow almost sixfold between 1985 and 1990, for example. The production of ultrapure substances for radioelectronic optics and technical means of communications will also be expanded. It is planned to establish 17 facilities for producing 17 new types of chemical plant protection agents, as a result of which there will be a considerable reduction of losses of principal agricultural crops by 1990. The production of special-purpose rubbers will develop at a relatively more rapid rate in the petrochemical industry.

Under the new conditions of management, the overfulfillment of the target for producing products in the highest quality category is not considered a fund-forming indicator and as a result enterprises have less motivation to produce these products. Customers, in turn, are sometimes unwilling to purchase products in the highest quality category because this leads to the disproportionate increase in the production cost of the final product and to the deterioration of economic indicators. The Ministry of the Chemical Industry, which produced 5.89 billion rubles' worth of high-quality products in 1985, is receiving only 25 million rubles in the form of price markups, which is less than the value of 0.5 percent of its total output bearing the state Quality Emblem. IT IS ESSENTIAL TO DEVELOP PROPOSALS WITH A HIGH DEGREE OF ECONOMIC SUBSTANTIATION AIMED AT INCREASING THE INTEREST OF CUSTOMERS IN ACQUIRING PRODUCTS IN THE HIGHEST QUALITY CATEGORY AND OF ENTERPRISES THAT PRODUCE THEM.

FOOTNOTE

1. "Materialy XXVII syezda Kommunisticheskoy partii Sovetskogo Soyuza" [Materials of the 27th CPSU Congress], Moscow, Politizdat, 1986, p 331.

5013
CSO: 1814/33

TASHKENT CONGRESS OF MECHANICAL ENGINEERS DESCRIBED

Tashkent PRAVDA VOSTOKA in Russian 25 Sep 86 p 1

[Interview with Deputy Chairman of the UzSSR Council of Ministers Gulyam Zakhritdinovich Zakhritdinov, chairman of the organizing committee of the Sixth All-Union Congress of Mechanical Engineers, by PRAVDA VOSTOKA correspondent V. Chernomorskiy: "The All-Union Congress of Mechanical Engineers"; date and place not specified; first paragraph is PRAVDA VOSTOKA introduction]

[Text] The Sixth All-Union Congress of Mechanical Engineers, organized jointly by the USSR National Committee on Theoretical and Applied Mechanics and the Uzbek SSR Academy of Sciences with the participation of the country's leading scientific institutions and VUZ's opened yesterday in Tashkent. Our correspondent interviewed Deputy Chairman of the UzSSR Council of Ministers G.Z. Zakhitdinov on the significance of this event.

[Answer] "The importance of the event can be judged by the fact that approximately 3,000 persons are participating in the work of the congress," Gulyam Zakhritdinovich stated. "They include more than 40 academicians and approximately 50 corresponding members of the USSR Academy of Sciences. There will be approximately the same number of academicians and corresponding members from union republic academies of sciences and roughly 1,000 doctors of sciences. At the congress, as they say, the entire pick of basic and applied science, which plays an important role in the acceleration of scientific and technical progress and the development of the national economy and such leading sectors of it as construction, machine building, metallurgy, chemical production, and others, is represented.

"The congress, which will last until 30 September, will hear 1,577 reports on important problems of analytical mechanics and the stability of motion, oscillations of mechanical systems, the mechanics of solids, spaceflight, hydrodynamics, gas mechanics, elasticity theory, wave propagation, seismodynamics, the mechanics of robots, biomechanics, and other areas of the science of motion. The congress will also examine the development of new forms of contact of science with production in the light of the demands of the 27th CPSU Congress, the speeding up of the introduction of promising scientific developments, coordination of the activity of numerous scientific subdivisions of mechanical engineers, and the teaching of science in higher

and secondary specialized education institutions. The work of the congress will be carried out in 4 sections and 29 subsections. Deputy Chairman of the USSR Council of Miniseters and Chairman of the USSR State Committee for Science and Technology Academician G.I. March, President of the USSR Academy of Sciences Acaedmician A.P. Aleksandrov, and N.V. Arzamastsev, a responsible official of the CPSU Central Committee, are participating in the work of the congress."

[Question] "How will Uzbekistan's science be represented at the congress?"

[Answer] "Very widely. Republic scientists will present more than 100 reports in which the results of research on the theory of stability of motion, on fluid and gas mechanics, on hydrodynamics, and, of course, on seismodynamics are summarized. The results of this research have found reflection in the solution of such tasks as the stabilization of an asymmetrical satellite and the determination of optimal hydrodynamic parametemrs of irrigation and were the the basis for the development of new machinery and technology for producing oil and gas, techniques for controlling water and wind erosion, and much more.

"The theoretical and practical work of Uzbek scientists in the area of earthquakeproof structures has won worldwide recognition. The Institute of Mechanics and Seismic Resistant Construction of the UzSSR Academy of Sciences is the major, leading scientific research center in this area, whose activity is practically embodied in Tashkent, which was restored after the earthquake. The fundamental theory of subsurface structures, which has made it possible to calculate and design such unique projects as the Tashkent Metro and many other civil industrial projects, was developed here. Relying on this theory, metros are being designed in many cities of the world, where the danger of earthquakes exists.

"And on the whole, Uzbekistan's scientists specializing in the field of mechanics are working at the level of the world's leading scientific schools."

[Question] "Does this apparently also explain the fact that Tashkent was chosen as the place for holding the regular forum of mechanical engineers?"

[Answer] "Not only. It was also chosen as a measure of respect for such Uzbek scientists as Academician of the UzSSR Academy of Sciences Kh.A. Rakhmatulin, a professor of Moscow State University and Hero of Socialist Labor, and Academician of the UzSSR Academy of Sciences M.T. Urazbayev, who were at the source of Uzbekistan's scientific school of mechanics, educated highly skilled personenl, and made a major contribution to basic and applied science. Especially in the years of the Great Patriotic War, when these scientists' research made it possible to bring the day of victory over fascism closer."

[Question] "In what kind of measures will congress delegates participate in addition to working in sections and subsections?"

[Answer] "During the days of the forum, there will be the exhibit 'Theoretical and Applied Mechanics in the Republic's Economy' at the

Exhibition of UzSSR National Economic Achievements; the book exhibit 'Advances of Mechanics,' at which works of scientists of the country are being displayed, will be at the House of Consumer Cooperatives. Delegates to the congress will visit Samarkand and Bukhara, Tashkent VUZ's, scientific research institutes of the UzSSR Academy of Sciences, and industrial and agroindustrial enterprises, and will meet with student youth. Without a doubt, the Sixth Congress of Mechanical Engineers will give new impetus to the development of this most important science in Uzbekistan."

5013
CSO: 1814/60

TASHKENT SYMPOSIUM ON COMBUSTION, EXPLOSIONS

Tashkent PRAVDA VOSTOKA in Russian 18 Oct 86 p 1

[Article: "A Timely Symposium"]

[Text] In Tashkent, the Eighth All-Union Symposium on Problems of Combustion and Explosions came to an end. Approximately 1,000 scientists and industrial specialists representing scientific research institutes, VUZ's and other organizations from various cities and scientific centers throughout the nation explored wide-ranging theoretical and practical problems in important, promising directions of modern technology during their 5-day meeting.

How can fire, which according to the ancient legend of Prometheus has long brought good to people, be made to burn more warmly and brightly? Participants in the symposium expressed their proposals on these questions in 389 reports included in the discussion program and in the course of the scholarly debates. The program was in the form of five sections that met daily. One of them--the student section--was for the first time included in the program for these traditional meetings. The sections examined problems in the theory of combustion and explosion and their potential applications to practical technological problems: ways of using combustible raw materials more efficiently; ways of increasing the technological payoff and efficiency of chemical and other reactions in the process of combustion and explosions; fuel and energy conservation; environmental protection, in particular, the protection of the air against pollution with harmful gases and effluents.

Some works by Uzbek scientists also received high marks in this regard. Among them: the search under way at the Tashkent Highway Institute for a so-called alternate fuel for internal combustion engines, in particular, for automotive engines and their conversion from conventional types of fuel to more economical and ecologically pure gas. The developments of scientists of the Central Asian Affiliate of the All-Union Scientific Research Institute of Gas Utilization in the National Economy and Underground Storage of Gas, which are aimed at the increase of the efficiency of combustion of gas and other types of fuel, energy conservation, and environmental protection, were noted.

"Such assessments, of course, cannot but delight us,"" D.M. Akhmedov, affiliate director and winner of the Uzbek SSR State Prize imeni Beruni, stated in an interview with an UzTAG correspondent. "But we are nevertheless

more inclined to regard them as kind wishes for the future. Even though our collective is not very large, it has sufficient scientific and creative potential to raise even more the quality and significance of our research on the basis of the reform, which is now being carried out intensively, and to increase its production return. Of late at the institute new scientific directions have been actively developed--automatic modular burners and new combustion devices that discharge a minimum of harmful substances are being devised, new devices are being developed for thermal electric power plants and industrial enterprises not only of the republic, but of other parts of the country as well. We are confident that the present symposium, the participation of prominent Soviet scientists and specialists in the symposium, and familiarization with their experience will enable us, like all other participants in this representative meeting, to solve scientific and practical problems faster and more successfully."

5013
CSO: 1814/60

FIRST CONGRESS OF BERNOUILLI SOCIETY HELD IN TASHKENT

Tashkent PRAVDA VOSTOKA in Russian 9 Sep 86 p 2

[Article by Professor V. Zolotarev (the Institute of Mathematics imeni V.A. Steklov of the USSR Academy of Sciences), and UzTAG correspondent Ye. Yefimov: "Science in the Service of Peace and Progress. The First Congress of the Bernouilli Society Opened in Tashkent"]

[Text] One more page devoted to Tashkent has been written in the history of science: Uzbekistan's capital was chosen as the site of the first World Congress of the Bernouilli Society. This forum of mathematicians, which assembled representatives of more than 40 countries from all continents, opened on 8 September.

On that morning the Theater imeni Alisher Navoi was decorated with purely mathematical emblems--symbols denoting the basic concepts of the theory of probability. And entirely in keeping with the language of science, words were spoken about the scientist's high calling: to promote progress in all fields of knowledge in the name of peace, mutual understanding, and the good of peoples.

The congress was opened by Academician Yu.V. Prokhorov, chairman of the Soviet organizing committee.

Deputy Chairman of the UzSSR Council of Ministers S.Yu. Sultanova delivered a message of greeting to participants in the congress.

Chairman of the Tashkent City Soviet Executive Committee Sh.R. Mirsaidov and President of the UzSSR Academy of Sciences P.K. Khabibullayev warmly congratulated the guests and wished them success in their work.

The significance and tasks of the congress were characterized by Chris Hyde (Australia), president of the Bernouilli Society, and Klaus Krikeberg (France), chairman of the International Program Committee.

The program of this meeting, which will last until 14 September, includes plenary meetings, round table discussions, and lectures on the history of mathematical statistics and probability theory. The various aspects of theory and the practical application of this branch of knowledge will be examined by

the more than 30 sections of the congress. The "geography" of the reports and papers is broad: the preliminary list of speakers includes representatives of a number of science centers from more than 20 countries.

Participants in the congress heard warm words from Andrey Nikolayevich Kolmogorov, the head of the Soviet school of probability theory and the most prominent mathematician of modern time. He emphasized the consistency and depth with which the international scientific community is developing and enriching the ideas of the founder of the theory of probability and mathematical statistics, and noted the contribution that has been made to the theory and its different practical applications by scientists belonging to the Bernouilli Society. A.N. Kolmogorov noted that we all feel that research on very large systems is one of the principal demands made on mathematics in our time. Here, too, mathematical methods come to our aid.

Following the opening ceremonies, the assemblage listened with keen interest to the report by A.N. Kolmogorov and V.A. Uspenskiy "Algorithm and Contingency," which was devoted to the development of the basic concepts of probability theory from modern positions.

5013
CSO: 1814/60

BRIEF

MICROCRYSTALLINE, POWDERS CELLULOSE--(UzTAG)--The introduction of new types of chemical materials is an important direction of scientific and technical progress. A special place among them is occupied by microcrystalline and powder cellulose which is more and more widely used in the paint, varnish, and food industry, medicine, and other sectors. The All-Union Scientific Seminar that opened on 17 September in Tashkent was devoted to the problems the production and use of these materials. For 3 days scientists and specialists from the nation's major chemical centers will discuss the prospects of development of the production of microcrystalline and powder cellulose and will explore the most economical ways of producing these materials. [Text] [Tashkent PRAVDA VOSTOKA in Russian 18 Sep 86 p 3] 5013

CSO: 1814/60

ADVANCES IN INCOHERENT OPTOELECTRONICS

Moscow IZVESTIYA in Russian 6 Sep 86 p 3

[Article by Academician Yu. Pozhela, Lenin Prize winner and Hero of Socialist Labor, under the rubric "For the USSR State Prize": "Optoelectronics Serves Acceleration"]

[Text] Optoelectronics today is penetrating the most different spheres of the national economy. So-called incoherent optoelectronic instruments are developing at a particularly rapid rate. The characteristic feature of these instruments is that information in them is transmitted by means of short flashes of light. This entails a large number of interesting and useful applications. Let us take, for example, the optron--a typical incoherent optoelectronic instrument. In it the electrical input signal excites a radiating element, the light from which acts upon a photodetector, and in it an electrical signal similar to the input signal is generated again. Connection with high-voltage units, contactless control of power mechanisms, for example, in robotics, applications in intricate microelectronic complexes--such is the far from complete list of what the optron can do. In many devices optrons take the place of bulky transformers and unreliable relays.

If the optron's radiator is "swept" in such a way that the light is directed outward, one obtains an optoelectronic sensor which is capable by light pulses as if of "feeling" objects, determining in so doing the state of their surface, the rate of movement, and so forth. Such sensors are used to monitor the rapidly rotating parts of ultracentrifuges of gas turbines and electric motors. Such sensors are convenient for maintaining the uniformity of the movement of a tape in a tape recorder, for the high-speed counting of objects on a conveyer, and for monitoring the quality of machining of parts on NC machine tools.

If the sensor is equipped with a photodetector capable of registering changes in the spectral composition of radiation, it can be used to monitor the gas pollution of the environment and to measure change in the moisture content of the soil, foodstuffs, and raw materials.

All mass types of optrons are produced with the State Emblem of Quality. It is also characteristic that a number of scientific advances by Soviet

researchers have world priority in this area; most important among them is the determination of the conditions, under which the conversion of electric power into light energy occurs virtually without losses.

This entire complex of work was carried out by a collective of authors that includes coworkers of scientific research institutes and design bureaus of the electronics industry, the USSR Academy of Sciences and VUZ's, and a number of plants engaged in series production. It is unquestionable that "The Development and Broad Introduction of Incoherent Optoelectronic Instruments in the National Economy" is worthy of the USSR State Prize.

5013
CSO: 1814/57

ION BEAM RESEARCH NOMINATED FOR STATE PRIZE

Moscow IZVESTIYA in Russian 13 Sep 86 p 2

[Article by Academician Ye. Velikhov under the rubric "For the USSR State Prize": "Powerful Beams of Atoms"]

[Text] The need for powerful ion beams was dictated by the the practice of exploratory thermonuclear research, one of the basic directions of which calls for holding a plasma in magnetic traps and heating it to temperatures on the order of 100 million degrees. Injection of powerful beams of high-energy hydrogen (deuterium) atoms into a plasma-filled magnetic trap was proposed as a highly efficient heating technique. In the early 1960's it was technologically impossible to create flows of fast atomic particles with the necessary degree of intensiveness.

As a result of more than 20 years of concerted effort by scientists at a number of our country's leading physics institutes, the desired results have been attained. This became possible after the solution of a complex of difficult physics and engineering problems.

Highly productive ion generators, which create unprecedented summary flows of charged atomic particles, were developed. Soviet scientists surmounted difficulties associated with the extremely difficult task of forming powerful ion beams with small angles of divergence. Many problems associated with the behavior of the beam in the so-called beam channel have been solved. The basic objective of this part of the research is to preserve the beam in case of its distribution over the channel and to reduce energy losses. Essentially, a new type of energy transfer in a vacuum, which is very efficient and has a high concentration of power, is realized.

The results of the research served as the basis for the creation of high-current sources of positive ions that form beams of tens (up to 100) amperes. The power carried by such a beam comprises several megawatts. Sources of negative ions, which are based on the surface-plasma method of production, have been developed. Foreign laboratories, while developing their own designs, have been oriented toward these sources, but so far the Soviet prototypes have not been surpassed in the parameters. A negative ion source, of which the volumetric plasma [obyemno-plazmennyy] method was made the basis, has been developed. Operating in a continuous mode, it has no analogs abroad.

Utilization of the results of research and development has enabled Soviet scientists to develop powerful injectors of fast atoms for thermonuclear plants.

These results are of great interest for other branches of science and practice. They include above all the use of sources of negative ions in high-current high-energy accelerators, what are called "meson-producing cyclotrons," which are used to study matter at the subnuclear level. Next, a number of applied ion systems were created, in particular, a technique of the ion-beam welding of metals, in case of which the ion beam simultaneously heats and alloys the weld material with the aid of a measured addition of the proper type of ions and hardens the seam, by exciting ultrasound oscillations in the molten metal, was proposed and implemented.

The examples already cited show that the beam is a unique instrument, a means which makes it possible to effect simultaneously energy transfer and mass transport.

Authors of the series of works "The Creation of Ion and Atom Beams of Large Power and Duration" laid the scientific foundation for the development of fields of technology, which involve the use of the possibilities afforded by beams. Their activity has won recognition in our country and abroad and merits the high recognition of being awarded the USSR State Prize.

5013
CSO: 1814/58

PLASMA PHYSICISTS NOMINATED FOR STATE PRIZE

Moscow PRAVDA in Russian 16 Sep 86 p 2

[Article by Academician Ye. Velikhov under the rubric "For the USSR State Prize": "Theory and Its Applications"]

[Text] The young science of plasma physics has been rapidly developing in recent decades. The sun and stars, the interstellar medium, circum- and interplanetary space are gigantic plasma systems. Hence the high degree of scientific interest in understanding the laws of plasma. Nevertheless, it is not this interest but rather the needs of the scientific and technical progress of society that are the basic stimulus of the development of plasma research.

The strongest impetus to plasma research was given by the problem of controlled thermonuclear fusion (CTF), the solution of which requires a knowledge of the regularities of plasma behavior--at thermonuclear temperatures (tens of millions of degrees) matter is in a plasma state. However, not only CTF, but powerful radioelectronics, problems of the propagation and utilization of intense radio waves, laser technology, plasma technology, and the tasks of creating accelerators of high-efficiency charged particles are wonderful stimuli of such research. As we see, the range of plasma's "work" under terrestrial and cosmic conditions is extremely wide.

A characteristic feature of plasma is that currents that generate various types of electromagnetic waves are easily excited in it. Therefore, the change that originates in the state of plasma very rapidly--with the speed of electromagnetic waves--spreads throughout the plasma, drawing all of it into common, collective wave motions. This indicates that the science of wave processes in plasma physics is the core of plasma physics. And here so-called nonlinear wave phenomena, when intense waves and powerful flows--beams of charged particles substantially influence the state and properties of plasma--naturally come into play. It should be noted that research on the general regularities of nonlinear processes in all manner of wave media--physical, chemical, biological--is one of the principal directions in science of our century. A special role here has been and is being played by plasma, being a unique object of research that is characterized by a large number of various types of waves that dampen weakly and that are easily excitable. As a consequence, nonlinear effects are manifested even in case of low-amplitude

waves, so that a plasma is a medium with sharply pronounced nonlinear properties.

It is a pleasure to note that for more than 25 years the works of Soviet scientists as a whole have appreciably led the corresponding foreign research.

Research on high-frequency (HF) nonlinear wave processes in a plasma is of the greatest importance. The basic role in this research is played by a light, mobile electronic component and it characterizes the fastest response of a plasma to powerful effects--electromagnetic, beam, and so forth. On the other hand, nonlinear properties are manifested more clearly in HF processes, since the picture of the phenomena is less veiled by the complex motion of heavy particles. It is specifically Soviet scientists who have developed the bases of the theory of high-frequency nonlinear wave processes in a plasma.

The series of works nominated for the USSR State Prize--"Principles of Nonlinear Dynamics of High-Frequency Wave Processes in a Fully Ionized Plasma"--laid the foundation for one of the core divisions of plasma science, created the scientific basis for solving urgent applied problems, and made a substantial contribution to the science of nonlinear wave media.

The authors of the series not only developed a new body of mathematics, but also used it as a basis for predicting a number of qualitatively new phenomena that are confirmed by numerous experiments, among which the discovery of parametric decay instability has been registered by the USSR State Committee for Inventions and Discoveries. The present level of understanding of the problems and perspectives of laser CTF could not have been attained without the works in the nominated series. Works in the series also served as the basis for the development of HF heating techniques at Tokamak thermonuclear installations. These methods are now acknowledged as holding the greatest promise for use in future Tokamak reactors.

One of the serious applications of the conclusions of theoretical work is the use of its results for the creation of new diagnostic methods. The pioneering ideas of the authors of the series on the high-frequency initiation of large-scale hydrodynamic processes in a plasma (which has been confirmed by numerous experiments) are at the present time being successfully applied to problems in the physics of the ocean and the atmosphere.

The services and priority of the authors of the series are acknowledged throughout the world, their results are included in monographs and textbooks on this question.

5013
CSO: 1814/58

CLOSED-CYCLE PRODUCTION SYSTEM NOMINATED FOR STATE PRIZE

Moscow PRAVDA in Russian 17 Sep 86 p 3

[Article by Academician B. Laskorin and Professor V. Zaytsev under the rubric "For the USSR State Prize": "In a Closed Cycle"]

[Text] Analysis of the dynamics of the growth of gaseous, liquid and solid waste in the key sectors of industry shows that despite the fact that the rate of consumption of raw materials per unit of finished output is systematically declining, the total volume of effluents is growing. Even with the largest scale of construction of purification facilities, it is nevertheless not entirely possible to protect the atmosphere and hydrosphere against their harmful impact. Only the creation of ecologically substantiated low-waste and waste-free production processes and facilities can provide a fundamental solution to the problem.

The closed industrial water supply and waste processing system at the Pervomaysk Khimprom Production Association can serve as an example of the integrated approach to the solution of ecological problems.

In the production of chlorine and caustic soda a local return cycle of the shop for the concentration of alkali with the recycling of waste water has been in operation here since 1985. The feeding of the system with unconditioned condensate from evaporators is envisaged. This has made it possible to considerably reduce the consumption of fresh water, to reduce the number of purges of the system, and to reduce the consumption of hydrochloric acid by 1,000 tons a year.

In the production of suspended polyvinyl chloride waste water is recycled after local purification and the polymer extracted from it is used as a plastifying additive for road surfaces. Following local purification, the effluent from the production of copper oxychloride is converted into a commercial solution of calcium chloride. In the production of detergents, following local purification and wet dust trapping the waste waster is returned to the process at the stage of the production of composites.

Since 1973 the Pervomaysk Khimprom Production Association has operated a full biological purification facility. The problem of the recycling of the waste water, which passes through it, for water supply was also solved here. Since

1979 an installation for the intensive purification of this water, at which a regeneration system with the use of solutions of nitric acide and ammonia is used, has been in operation. Here concentrated nitrate solutions that can be used in the production of complex nitrogen fertilizers are formed. They are produced and granulated in the same apparatus: a pulverizing dryer-granulator with a fluidized bed.

Waste water with a higher degree of mineralization (water from heat and electric power plants and certain types of works) must not be reused in plant water circulation until the salt it contains has been extracted. In this connection its demineralization by distillation is envisaged. The evaporator at the Pervomaysk Khimprom Production Association is unique: it ensures a high quality of the obtained distillate, which makes it usable for the water-level maintenance of high-pressure boilers at heat and electric power plants and for technological purposes.

Such are the fragments of the general system that has enabled the Pervomaysk Khimprom Production Association to halt entirely the discharge of all types of industrial sewage into open bodies of water since 1980. The experience of the operation of the closed resource-conserving system of industrial water supply and the processing of industrial waste has confirmed its high ecological and economic effectiveness. The annual output from waste exceeds 30,000 tons, the annual economic impact from reducing material and energy expenditures and producing marketable products from production waste is more than 4.5 million rubles.

It is envisaged to make available at other enterprises individual technological assemblies of the system and the system as a whole with allowance made for local conditions.

The large-scale effort performed by a number of scientific research and design organizations and design organizations and by the collective of the Pervomaysk Khimprom Production Association can be characterized by a single phrase: for the first time. The complex of resource-saving, waste-free technologies has no analogs in either domestic or foreign practice. Because of its national economic and socioeconomic significance, "The Development and Introduction in Industry of a Closed Resource-Saving System for Industrial Water Supply and the Processing of Wastes of the Pervomaysk Industrial Hub" unquestionably deserves to be nominated for the USSR State Prize.

5013
CSO: 1814/58

CHEMISTRY NOMINATION FOR STATE PRIZE

Moscow PRAVDA in Russian 13 Sep 86 p 2

[Article by Academician B. Nikolskiy, Hero of Socialist Labor, under the rubric "For the USSR State Prize": "Unusual Chemistry"]

[Text] It has long been known that the properties of chemical elements are determined by their position in D. I. Mendeleyev's periodic table. The chemical behavior of an element depends on its valent or oxidation state, which is associated with the electronic structure of the atom. The basic oxidation states of elements were established many years ago. These concepts were the basis of industrial systems for separating, purifying, and producing various elements and their compounds.

These concepts, which seemed unshakeable to many generations of chemists, were shaken to their foundations in recent years thanks to the works of Soviet chemists. The collective of chemists at the Institute of Physical Chemistry, the Institute of Atomic Energy imeni I.V. Kurchatov, the Institute of Geochemistry and Analytical Chemistry imeni V.I. Vernadskiy, and the Radium Institute imeni V.G. Khlopin, using the latest advances of Soviet and world science and technology in the field of inorganic synthesis (atomic beams, superoxidants, cryochemical methods, and so on), succeeded in obtaining compounds of many elements of the periodic system in hitherto unknown extremely low or extremely high oxidation states. Thus, for example, chemists were totally surprised by Soviet scientists' discovery of oxidation state 7 for transuranic elements: neptunium, plutonium, and americium. G. Seaborg, an American scientist and Nobel Prize winner, under whose direction these elements were first produced, called this work historic. Gold, for example, was produced in oxidation state 5 in the form of a compound containing fluorine; compounds of tetravalent nickel were synthesized; lanthanide and transuranic elements have been produced in a bivalent state. Advances of Soviet scientists in the synthesis of new compounds and the study of their properties made it possible to identify new regularities.

The results of these works of many years, which have been summarized in the form of the series of studies "The Production of Compounds of Metals in Previously Unknown Oxidation States, the Investigation of Their Properties, and Application," have been nominated for the USSR State Prize.

The pioneer nature and outstanding successes of the collective of scientists are confirmed by the fact that the results of works belonging to the series are protected by three discovery certificates and many inventors' certificates, which have been issued by the State Committee for Inventions and Discoveries.

In addition to its substantial contribution to basic chemical science, this research is of great practical significance. On its basis new technological operations at radiochemical works were developed and existing ones were improved; their introduction produced a considerable economic impact. Original methods for analyzing actinides, which are used in industry, were developed. Compounds were synthesized for the production of new catalysts, semiconductors, and construction materials.

The works of the authors of the series are widely renowned in our country and abroad and have stimulated the conducting similar research in the United States, France, the Federal Republic of Germany, India, and Poland. There is every right to say that the authors have created a new field in chemistry--the chemistry of elements in unusual valent states.

5013
CSO: 1814/58

- END -